ARITHMETIC

FOR

YOUNG CHILDREN

BEING

A SERIES OF EXERCISES EXEMPLIFYING THE MANNER IN WHICH ARITHMETIC SHOULD BE TAUGHT TO YOUNG CHILDREN

By HORACE GRANT

American Edition

EDITED BY WILLARD SMALL

BOSTON
LEE AND SHEPARD PUBLISHERS

This book was originally published under the superintendence of the Society for the Diffusion of Useful Knowledge.

The steady demand for this little book from many prominent teachers, superintendents, and others interested in primary instruction, has induced the present publishers to issue it at a lower price, and with such changes as will better fit it for use with American children.

Sent, postpaid, to any teacher on receipt of 40 cents net.

IN PREPARATION,

SECOND STAGE OF ARITHMETIC,

ARITHMETIC

FOR SCHOOLS AND FAMILIES.

BY HORACE GRANT.

LEE AND SHEPARD, PUBLISHERS.

CONTENTS.

SECTION V.

SECTION VI.

SECTION VII.

SECTION VIII.

SECTION IX.

SECTION X.

REMARKS

ON

TEACHING ARITHMETIC;

AND ON

THE PARTICULAR DESIGN OF THIS TREATISE.

THE following little Treatise is intended for the instruction of children between the age of three or four, and six or seven; but older children, whether they have or have not commenced Arithmetic, may perform many of the exercises with advantage, as nothing can compensate for the absence of such an accurate knowledge of the foundation of the science as exercises of this description are calculated to give.

To most persons, the earlier operations of Arithmetic appear sufficiently simple for the comprehension of an infant; but those who have had the greatest experience in teaching, have found that abstract numbers are much less simple than they appear; and that, even with children of the age of five or six,

some pains must be taken, and much repetition endured, in laying clearly and firmly the foundation of the Mathematics. This pains and trouble will, however, be amply repaid by the rapid progress of the pupil afterwards, not only in Arithmetic, but in every branch of mathematical science.

Arithmetic is commonly learned by rote, and is never thoroughly learned; it is almost always an unpleasant task both to teacher and pupil, and conduces very little to the general improvement of the mind. An endeavor has, therefore, been made to prepare this Treatise in such a manner that the pupils shall be entertained in their progress, and shall be led on to discover most things for themselves, and to exert and improve their mental faculties.

This first stage, or horn-book of Arithmetic, consists almost entirely of mental Arithmetic. For the mass of mankind, written Arithmetic, like written language, is of comparatively little use; but that arithmetic of the head, which is never absent when once firmly associated with every thing around, is of incalculable use, even though it should stop short of the larger numbers. If a young person goes no further than to the extent of this little Treatise, he has done much; more, indeed, than many of those who have, as it is phrased, gone through Arithmetic. He has thoroughly mastered the smaller numbers, which

are used a hundred times for once that larger numbers are required, and which are the pivots whereon the larger turn. He possesses an instrument, small indeed, and of limited power, but perfectly under his command, and of service to him every hour; whereas the schoolboy arithmetician knows nothing of the instrument which he works blindly, and which he can only work under peculiar and favorable circumstances. Other instruments he must have to render the first available; and, after all, the little he knows is apt to waste rapidly away.

A great defect of the existing elementary works on Arithmetic arises from the little variety they offer to the child, either in objects, thought, or language. Their authors are satisfied if they present a proposition, regarding number, under one point of view, when it is ten to one if the child can apprehend it thoroughly unless it be presented in many lights, and under many varieties of language. In fact, the whole of Arithmetic is too apt to be taught as a series of tables of abstract number, and the pupils ever after find it difficult to extricate themselves from the deep and narrow ruts into which they have been driven.

A systematic treatise on Arithmetic, also, is divided into strict rules; and the pupil is required to exhaust the most difficult points of one rule before he

is permitted to commence the simplest parts of the next. In this Treatise rules are not mentioned, because it is not necessary to mention them. The pupil discovers them for himself when he wants them. He goes through the various portions of the subject according to their difficulty, and to the light they throw upon each other; not according to their place in a scientific arrangement. He is, by this means, in a condition to multiply and to divide small numbers, and to perform simple calculations in fractions, long before he can attempt the addition of large numbers. And as each operation facilitates the rest, he soon can grapple powerfully with the smaller numbers. For him they really have a meaning; so far as they go, they are a distinct language, and a clear and powerful instrument of thought. And this knowledge is attained in a space of time that would have been occupied, under ordinary circumstances, in groping painfully, and perhaps fruitlessly, at the very threshold.

Although we should not forget that we ought to teach knowledge for the purpose of improving all our faculties, still we must remember that we should also teach it because it is wanted for use in the world; we must teach it in the way in which it will be wanted and used in the world, and also in conjunction with those things that will render it useful. We

should not teach any subject so as to separate it from everything else, and render it practically useless, merely because the entire abstraction or separation of a science from all others happens to be best for some other purposes. A child, if sent to a foreign country, will learn the language in a few months. Instruct him, at home, by means of scientific works on grammar, by plans and books suited only to the learned or the initiated, and he shall learn less in as many years. The memory is refreshed, and the mind is to a certain extent instructed, by looking over an ordinary scientific work; but it is little of the real nature of a subject that can be learned by the beginner from this external labelling and ticketing. A science may be arranged and prepared for the instruction of youth; it may also be arranged in the most compact and logical form for the use of the philosopher: these arrangements may be equally scientific; but they must be materially different, because they have a very different purpose to serve.

Some reason has generally existed for the peculiar arrangement of this Treatise, though, at first sight, the work may present no signs of order. When a child sees four counters or two pebbles, he understands their number long before he has any clear notion of the words four and two, used alone. Counting with objects is, therefore, the first stage

practicable. Children also remember and understand the numbers of those things with which they are very familiar, before they comprehend abstract numbers: questions respecting familiar absent objects are, therefore, the next in difficulty. And the most difficult questions of all are those connected with abstract numbers, that is to say, with the names of numbers without any reference to present or absent objects. But as children are in a condition to understand *easy* questions of the second and third sort before they can manage difficult exercises of the first kind, questions of all three sorts have been mingled together, according to their relative difficulty, so that they shall mutually assist each other, and give that variety to the subject which the infant mind urgently requires.

The Arabic numerals, or ordinary figures, have been most studiously kept out of sight until near the conclusion of the Treatise, because it has been found that, when they are introduced very early, they relieve the pupil from the necessity of examining numbers thoroughly. They present a bright and clear picture to the eye, compared with which all other impressions and notions connected with number are slow of acquirement and dim; and thus their superficial clearness overpowers the more solid properties of their brethren. When kept in proper subordina-

tion, and allowed only their fair share of attention, they become most valuable assistants.

The Exercises have been confined almost entirely to numbers under thirteen, because it has not been thought advisable to run the risk of confusing the pupil with the larger numbers until he is thoroughly conversant with smaller ones of which the larger are compounded. The larger numbers also demand the immediate introduction of Numeration and Notation: these are the most important and difficult rules in Arithmetic; and it is chiefly owing to imperfect knowledge of them that the succeeding rules are found so difficult, and require so much time to get through, even in the mechanical and repulsive mode at present pursued.

No arithmetical tables of any kind, nor tables of moneys, weights and measures, should be learned by the child during the first stage: they would be of no use at this period, and would be very apt to disgust him with Arithmetic. In lieu of tables, a few of the most useful weights and measures should be shown to the pupil; and such manual, as well as arithmetical exercises, should be performed with them, as are indicated in various parts of this Treatise. With these the child would be much delighted; an agreeable variety of calculation would be attained; he would never forget what he had seen and handled;

and would take an interest in all future calculations about weights and measures.

The above remarks will explain, in some degree, the cause of the repetitions, and of the apparently trifling and homely nature of many of the questions, and also of the language in which they are couched. The state of mind of the child frequently prevents us from using the most correct and elegant phraseology and illustration. Variety of expression and copiousness of illustration, however, must be provided; and it will soon be found that they who restrict themselves to the most correct and scientific language are unintelligible to children. Great variety of language must studiously be used, or we shall not prevent the pupil from falling into many serious errors, which are certain to result from the invariable use of a single form of words. Before a child can understand the peculiar language of a science, he must understand something of the science itself. Besides, the general ignorance of children necessarily precludes forms of expression and modes of illustration which might be employed with advantage in teaching adults.

Although the teacher may find a new method of instruction somewhat awkward at first, a little practice will convince him of the pleasantness and efficacy of a rational procedure. He will soon find that much is to be learned by teaching others, provided

he does not teach by rote; and he will be ready to ascribe some instances of failure to his inexperience rather than to the dulness of the pupil.

When the teacher is acquainted with this plan, which is very simple, he will find little difficulty in modifying it, and providing additional exercises, so that it may be rendered exactly suitable to the children he has to instruct. Questions that are suitable for a child of four or five may be too simple for a child of nine or ten years of age. A country child and a town child will each require a different modification of the Exercises. A considerable variety has accordingly been provided; and the teacher may omit or delay, or alter any that are not found to be appropriate.

As Arithmetic only regards one quality of objects, namely, Number, an exclusive attention to it (or indeed to any other single study) is liable to contract the mind. Number should, therefore, form one of several simultaneous studies, and its study should occasionally be suspended altogether.

This Treatise is but the beginning of the subject; though, it is hoped, a rational beginning. With more experience it might have been made better; and it is now only offered as an introduction to the systematic study of Number, until a better work shall supersede it.

The second stage of Arithmetic may consist of Arithmetic taught upon the common plan; and it will be found that by previously going over this first stage, many of the ordinary difficulties of the science will be removed or lessened, and the time usually expended upon it greatly diminished.

A second stage is however projected, as a continuation of the present Treatise. It will commence with Numeration, and will include the most useful rules of Arithmetic applied to large numbers and fractions. It will be treated upon a plan differing considerably from that ordinarily adopted, and calculated (or at least intended) to make the science of Number agreeable, intelligible, and rational, — to make it practical in the highest degree, and yet to treat it as a science itself, and as an introduction to other sciences. In the first stage the pupil is taught to think and speak in numbers; in the second stage he will continue his former practice, and will unite with it the art of writing numbers; for there is no reason why we should violate, in Arithmetic, those laws of nature which hold good in general life, and which prescribe that we should think before we speak, and that we should both think and speak before we are in a fit condition to learn to write.

DIRECTIONS FOR THE TEACHER.

THE Exercises which compose this Treatise are placed exactly in the order in which they are to be performed. They are so fully worded, and the directions respecting them are so minute, that it is scarcely possible for any teacher, however inexperienced, to go wrong.

Previous to each lesson, the instructor should read over, carefully, that portion of the exercises of which the lesson is to be composed.

During the lessons, the teacher should place at hand a small box containing a few counters, pebbles, beans, and small shells. A variety of any kind of small objects, such as wooden cubes, buttons, marbles, nuts, nails, and bits of stick or cork, will also answer the purpose.

If the pupils are very young, the first lessons should be exceedingly short; two or three questions will be enough at the commencement, and the lessons may be gradually extended to five minutes. With older pupils the lessons may be lengthened by

degrees to ten minutes, or, at the utmost, to a quarter of an hour.

It is of the greatest consequence that the pupils should take pleasure in Arithmetic; the lesson should therefore invariably cease before they become inattentive or fatigued. The constant variety of occupation and almost incessant bodily motion which young children absolutely require, should also be carefully attended to. By duly regarding these remarks, the intelligent instructor will convert a usually hateful task into an agreeable pastime.

A few questions injudiciously pressed may give the child a distaste for Arithmetic which it may be very difficult to overcome. Should such an accident occur (as it may, without blame attaching either to teacher or pupil), the subject ought, without scruple, to be abandoned altogether, until the painful impression shall have abated.

When young children have gone through the first section, the lessons should cease for a week or ten days; and, before the second section is commenced, a few of the exercises in the first should be done again, to refresh the memory of the pupils, and to make sure that they have forgotten nothing. A similar pause should take place between the other sections. Older pupils, however, may only require the pause after every two sections; and some older

pupils may require no pause at all, and may not need to commence earlier than with the third or fourth section.

While the lessons are going on, no day should be allowed to pass without a lesson. The young pupil's progress depends very much upon the observance of this rule.

When the book has been completed, a pause of a month or two should take place; after which it should be gone through a second time, in the course of which many of the earlier exercises may be omitted. With very young children it will be advisable, after a pause of several months, to go through the exercises a third time, before Arithmetic is attempted in the common way. Older children, although they may have begun Arithmetic on the ordinary plan, will be much assisted and improved by going through the latter sections of this Treatise.

The whole of the ninth and tenth sections, and some of the more difficult questions in the previous sections, may be deferred until very young pupils go through the subject a second or third time. The difference of age, knowledge, and capacity in children, will also occasionally require that some of the exercises should be taken piecemeal, or be variously modified, and that others should be suppressed.

No tables of any description should be learned

during this stage. Their place is sufficiently supplied by questions on moneys, weights and measures.

Few of the following Exercises have been extended to higher numbers than twelve, because higher numbers require a knowledge of Numeration, which should be deferred till the second stage, as it is the most difficult rule of Arithmetic. But as larger numbers are compounded of smaller ones, these exercises will materially assist the learner in his future progress.

Although this little work was originally intended for domestic instruction, the greater part of it is suitable to infant and preparatory schools; but the classes for Arithmetic should be divided into as many portions as possible, and each portion should be instructed separately.

When children are perfect in Arithmetic, so far as this Treatise extends, they may begin the subject in the ordinary way. But it would be to their advantage if they could always unite Mental Arithmetic with the common mode of instruction.

MATERIALS NECESSARY FOR THE FIRST STAGE OF ARITHMETIC.

A Box, containing a few counters, pebbles, small shells, nuts, and beans, should be provided before the exercises are commenced. Its cost would be very trifling. Some half-inch wooden cubes would make a desirable addition: they might be had of any carpenter or joiner. A pound, half-pound, quarter-pound, and ounce weight; a yard and foot measure, either of wood or tape; and a few dimes, half-dimes, and cents, should also be provided.

The ball-frame or bead-table, now used in many infant schools, offers an agreeable variety, and may be had for a few shillings at most toy-shops. It is composed of a small wooden frame, having ten or twelve wire bars in one direction, on each of which are strung ten or a dozen movable balls.

A small pair of scales, with weights, would be found a valuable addition, especially for domestic instruction. They might be made by any one with a stick, two bits of tin, pasteboard or thin wood, and some string.

Where expense must be avoided, a few corks sliced up, or a stick sawn into thin round bits, would serve for counters; a bit of string would supply the place of a yard measure, the subdivisions being indicated by knots; and a bead-frame might easily be made with four sticks tied firmly together, having bars of string, and bits of cork or wood for balls.

ARITHMETIC

FOR

YOUNG CHILDREN.

SECTION I.

Operations with Objects to . . . . . 4.
Operations with Names of Objects to . . 3.

LET the teacher take up a counter, or any small object, saying to the child, This is one counter (or whatever the object may be). Let the child then be told to put one counter on the table. The teacher should then speak to the pupil as follows: —

Show me one finger.

Show me one chair.

How many heads have you?

How many noses have you?

I have placed two counters on the table; now I

have taken them off. Try if you can put two counters on the table. Put away the two counters, and put out two pebbles.

Take up one pebble; how many are left?

Take up the other pebble; how many are left?

Put out two shells; say "one" for every shell that you have put out.

Clap your hands once.

Show me two fingers. Show me two thumbs.

Take two steps on the floor. Go backwards one step.

How many mouths have you?

How many hands have you?

You have one head; what else have you one of?

Tell me all the things you have two of.

Here is one counter and one counter; what are one counter and one counter called?

Hold up one hand, and also the other hand; how many are up? Put down one; how many are up now? Put down the other; how many are up? how many are down?

Clap your hands twice, or two times. ("Twice" and "two times" should be used alternately, and in such a manner as that the child shall perceive they mean the same thing.)

Look at what I am doing. I have put out three counters; now I have put them back.

Put out two counters (or cubes, &c.), now put out another; how many have you put out?

Say "one" for each counter you have put out; how many times have you said "one"?

Hold out three fingers.

Point to three persons.

Show me three legs of a chair.

Strike the table once and once; how many times have you struck it?

Shut your hand; open one finger; open another finger; how many are open? Open another finger; how many are open now?

Lay down one counter and one bean; how many things have you laid down?

Lift up your foot three times.

How many cups, at tea time, must be put out for you and me?

Take three steps forward, and two steps backward.

How many joints has your thumb?

How many joints has your forefinger?

How many joints has your forefinger more than your thumb?

I have put one cent on the table; put as many more beside it as shall make three altogether.

Nod your head twice and once; how many times have you nodded it?

Make a mark on the slate for every window there is in this room.

Make a mark on the slate for each door in the room.

Put out a pebble for every book that I lay on the table. (Let the teacher lay three.)

Clap your hands once, and once, and once; how many times have you clapped them?

Tap the chair once and twice; how many times have you tapped it?

Put three counters on the table; now put another; three counters and one counter are called four counters.

Put three pebbles (or nuts, &c.) and one pebble on the table; how many have you placed there?

Put out two pebbles; now two more; how many have you put out altogether?

Say "one" for every pebble you have put out.

Shut your hand; open one finger; open two other fingers; how many are open?

Put down as many counters as you have hands.

Put out as many as you have hands and mouths.

Show me one chair and one table; how many things have you shown me? how many tables? how many chairs?

Touch four of my fingers.

How many are you and I?

How many are we if we count Anne also? — (Some *third* person should be mentioned who is in the room.)

Put on the table two cubes; make a mark on the slate for this one; now make a mark for the other; how many marks have you made? Rub out one of the marks; how many marks are there now? Rub out another; how many have you now? How many have you rubbed out altogether?

Walk four steps.

How many things have I altogether in my pocket, if I have a pencil, a knife, and a key?

Put out two cubes; now put out two more; how many twos have you put out? Two twos are called what?

Make a mark on your slate for each leg of this chair; how many marks have you made?

How many joints have both your thumbs together?

Put four pebbles in a row.

Put four pebbles in two rows; how many are in each of these two rows?

How many fingers have you on your right hand, without counting your thumb and little finger?

How many have you if you do count your thumb?

Say your own name three times.

Put down two counters; put down two more; now take away one counter: how many are left?

If that chair had a leg broken off, how many legs would be left?

Pat my hand once and twice and once.

If you and Anne and I are in the room, how many of us are in the room? How many would there be if Anne went out? How many would there be if you and I went out and Anne stayed in the room?

If John and you and I had a cent each, how many cents should we all have? (Exhibit three cents to the child.)

How many legs has this cat? (Show the young pupils a cat or dog, or the picture of one, or of some familiar quadruped with four legs distinctly visible.)

How many legs has the cat more than you have?

If you had one leg more, should you have as many legs as the cat?

How many legs have you less than the cat?

Try in how many ways you can place these two cubes or counters (as ⁚ ·· ∴, &c.)

Take out three beans. Take one bean from three, how many are left? Take two beans from three, how many are left?

How many beans must you put to, or add to, one, to have three beans?

Take one and one and one bean from three; how many beans are left?

Put out one counter: put two in a row below that; put three in a row below that; put four in a row below that.

Make as many marks on the slate as there are ones in three: rub out one mark; how many marks are left? Rub out another mark; how many are now left?

How many handles have three knives got?

Take two cubes for yourself and give as many to me as will let us have four altogether.

Try if you can put out two counters with your eyes shut all the time.

SECTION II.

Operations with Objects to . . . . . 6.
Operations with Names of Objects to . 6.
Operations with Abstract Numbers to . 2.
Also with Fractions, Moneys, Weights, &c.

THE teacher should continue his instructions as follows:—

Put on the table four pebbles; now put another on: four pebbles and one pebble are called five pebbles. Put the pebbles back, and put out five counters. (When the children learn the name of a number they should at once associate actual objects of various kinds with that name.)

Open your hand wide; how many fingers are open (with the thumb)?

Shut your hand; how many fingers are open? how many are shut?

Put out five counters; put them in two rows; how many are in each row? Put them in three rows; how many are in each row?

Open your hand; then shut one finger; how many fingers are open? Shut three fingers; how many are left open? How many are left open when you shut two fingers? when you shut four fingers?

Shut all but three fingers of one hand, and two fingers of the other; how many fingers of both hands are shut? how many are open?

Try in how many ways you can arrange three counters or cubes (. . . ⋮ ∴ ⁘, &c.)

Say the numbers from one to four.

Say the numbers from four to one.

If I buy two rolls at a cent each, how much shall I pay the baker?

Here is a dime, and there are some half-dimes; put down as many half-dimes as would buy as much as this dime.

Two half-dimes are worth as much as what?

A half-dime is half what?

This jug, when it is full, will hold a pint of water; and this jug will hold a quart; a quart jug holds as much as two pint jugs. How many times must I empty the pint jug into the quart jug to fill the quart jug? If I want to empty the quart jug, how many pint jugs shall I need?

How many pints are there in a quart of milk?

If you were to divide a quart of milk into two equal parts, what would each of those parts be called? ("Equal" should be explained.)

Show me a couple of fingers; show me two couple of fingers. ("Couple" should be explained, if not understood by the child.)

How many fingers have you altogether on your right hand? — on your left hand?

What else have you five of?

How many panes of glass are there in the lowest row of panes in the window? How many more do I need to make up five panes?

How many ducks are a couple of ducks?

How many fowls are two couple of fowls?

How many fingers have you on the left hand, without counting the thumb and little finger?

Has this stool more legs or fewer legs than five? How many fewer?

Are your arms and mine five?

How many arms have you less than four? How many less than five?

How many more joints must your forefinger have to have five?

How many dogs had a man and his wife; they had a lap-dog, a bull-dog, and two terriers?

Take two counters for yourself, take one for John, and give me as many as will make us have five among us.

If I were to give two apples for you and John, how many should you have and how many should he have?

If John had two cents, and you and I had a cent each, how much would all of us have?

A woman bought a cent's worth of cat's meat for her cat three days; how much did she pay for the whole of it?

If you have three cakes to divide between yourself, and your sister and me, how many should each of us have?

Shut your eyes, and take up three from these five counters.

If you had one and two nuts in your right hand, and two and one nuts in your left hand, which hand would hold most nuts?

If one doll costs a dime, how much do three dolls, at the same price, cost?

This stick, or measure, is one foot long; this other stick, or measure, is one yard long; show me how far a foot goes on the yard measure. (The pupil should be provided with a foot and a yard measure, or with bits of stick, tape, or string of the proper length.)

Try if you can find out how many feet are as long as a yard.

Measure this chair. Is it a foot broad? How many feet high is it?

Measure this table. Is it a yard high? Is it a yard across?

Measure the door with the yard measure. Is it a yard wide? Measure it with the foot measure. How many feet wide is it?

Measure two yards along the floor, beginning at the wall. Measure three feet in the same manner.

Try if you can measure the length of a yard on the floor with a foot measure.

Make a triangle: how many lines or sides are there? If this side were a foot long, and the other sides were each of the same length, how many feet would all the sides together measure? (If necessary, the pupil should be shown how to make a triangle.)

What is another name for "one," "one"? (This is the first question on abstract numbers. The young pupil should be studiously kept from *figures* until he reaches the latter sections.)

When I say "one," "one," how many words do I say?

When I say "two," how many words do I say?

Two is a short way of saying what?

What would two things be called if one were taken away?

What would "one" be called if another were added or put to it?

Put out five counters; now put out another counter: five counters and one are called six counters.

Put these six counters into twos; how many twos are there?

Put them into threes; how many lots of three are there?

Put them into ones; how many ones are there?

How many lots or heaps of four can you find in six counters? (One, and a lot of two besides.)

How many fives can you find in these six counters?

A lot of six counters contains two lots of how many? — It contains three lots of how many?

I will cut this square piece of paper into two parts of the same size; what is each part called? (Half.) How many halves is it cut into? Here is a counter which is cut into two parts of the same size; what is each of those parts called? (A bit of cork or stick will answer the purpose of a cut counter.) How many halves are there in the whole counter? Here is a whole counter that has not been cut; how many halves could it be cut into?

Draw a line on the slate; divide it into two parts of the same length; what is each bit called? Half of what? The whole line is made up of how many halves?

If I gave to you one apple between yourself and your sister (or brother, &c.), how much of it ought you to keep, and how much should you give to her?

This weight is called a pound weight. Take it in

your hand. (The teacher should give a pound weight to the pupil.) A piece of bread or a stone, or anything that is just as heavy as this, would be said to weigh a pound, or to be of a pound weight.

This weight is half a pound. Take it in your hand. How many of these weights do you think would weigh as much as a pound weight? (The teacher should, if possible, show the pupils a pound and a half pound weight. They will not readily forget the knowledge of weights and measures which they receive directly from objects; and all subsequent questions on weights and measures will interest them much more, and be much better understood. A number of very entertaining exercises, similar to those with the yard measure, may be performed by the child with a small pair of scales and a few weights. Scales might be made with two bits of thin wood, tin, card or pasteboard, and a bit of stick; and stones would serve for weights. The trouble that such exercises cause the teacher is small, and would be amply repaid by the pleasure and progress of the pupil.)

A girl carried a pound loaf in one hand, and a two-pound loaf in the other; how many pounds of bread did she carry?

If a loaf weighed twice as much as this pound weight, how much would it weigh?

Suppose that you had picked up a stone that was half as heavy as this pound weight, how much would you say that it weighed? How many such stones would weigh a pound?

A man went to market and bought a pound of meat, two pounds of bread, and a pound of butter; how many pounds had he to carry home in his basket?

How many pint pots hold as much as two quart pots?

A farmer had two sheep, each of which had two little lambs; how many lambs were there?

Another farmer had two sheep and three lambs; one of the sheep had one lamb only, how many lambs must the other sheep have had?

Try in how many ways you can arrange four cubes or counters.

Put out two counters; take away half.

Put out twice as many pebbles as one.

Put out four counters; take away half.

Put out twice as many pebbles as two.

Put out half as many pebbles as four.

Put out three times as many shells as one.

One sheep had one lamb, another sheep had twice as many lambs; how many lambs had the last sheep.

Arrange six counters in pairs; how many pairs do you find?

Put out six shells. If one shell be taken from six, how many remain? — if two be taken, how many are left? — if three be taken? — if four? — if five? — if six be taken? (The shells should be before the

pupil during this and several following questions, but they should not be touched by him unless he is not able to answer the questions without.)

If once two be taken from six shells, how many are left? — if two twos, or twice two? — if three twos, or three times two?

How many things are three chairs, two candlesticks, and a fiddle?

Try if you can find out without looking, and only by feeling, how many counters are in each of my hands? (Let three be in the left hand, and five be in the right.)

If a lot of three (or once three) be taken away from six shells, how many remain. If two threes, or twice three, be deducted or taken away from six shells, how many are left behind?

How many shoulders have you and I? How many have you and I and Anne?

A woman had two daughters and three sons, how many children had she? How many were with her at dinner one day, when the oldest girl and boy were at their grandmother's?

A hen had six chickens, but some rats killed two of them; how many chickens had she then left of the six?

Another hen had also six chickens, and some rats ate one, and two fell into a ditch and were drowned; how many chickens had this hen left?

I bought three parcels of cakes; each parcel con-

tained three cakes; I gave one cake of each sort to a little boy, and one cake of each sort to the boy's sister; can you tell me how many cakes were left? (This question may, perhaps, require the aid of counters.)

SECTION III.

Operations with Objects to . . . . . 7.
Operations with Names of Objects to . . 7.
Operations with Abstract Numbers to . 3.
Also with Fractions, Moneys, Weights, &c.

TELL me another name for one and one.

Tell me another name for one, one, one.

Twice one, or two times one, is called what?

Thrice one, or three times one, is called what?

Two is a name for the same thing as what?

(It is necessary to use a great variety of expressions, occasionally even awkward expressions, and to put the subject in very many lights, before we can be certain that the young pupil understands abstract numbers thoroughly. Many questions on abstract numbers should not be asked at one time, lest the pupil become tired of such numbers.)

Make a square on your slate. (The teacher should draw a square, if necessary.)

How many sides or lines has this square?

They ought to be all of the same length If the top line measured a yard, how many yards would all the sides measure?

Some men put a post into a river to tie boats to; the post was three feet above water and two feet under water; how long was it?

How many legs must be put on to a dog for him to have five legs?

Two; how many times one are they?

What is another name for two?

What is another name for three?

Three is a name for how many times one?

A little insect, which had six legs, met with an accident and had two broken off; how many legs was it obliged to walk with afterwards?

How many legs have you and Charles and I?

Three old soldiers were walking along the road; William had but one leg, Charles had two legs, and John had only one; how many legs had these three soldiers to walk with? How many wooden legs would they need, so that each soldier should have two legs?

Make six marks on the slate, of any kind that

you like. How many are left if you rub out two and one? Are any left if you rub out three and two?

What number is the half of two?

What number is twice two or two twos?

Cut this bit of paper into two parts of the same size; what is each of these parts called?

If an orange were divided equally between you and George, what part would each of you have?

What must I do to this apple to have half an apple? (Any object that the children have been in the habit of seeing divided will serve in place of an apple.)

If I cut this apple, how many halves shall I have?

If a sailor had half as many hands as you, how many would he have?

What part of a quart is a pint?

One is what part of two?

Twice means the same thing as how many times?

How many times are thrice?

A spider caught in his web, one fine day, two flies and a gnat and a bee; how many animals did he catch that day? How many did he eat for dinner if he ate all but one, which he kept for supper?

Peter lost a pen, and Edward lost twice as many; how many pens did Edward lose? How many pens did both boys lose?

John lost two buttons off his jacket, and Harry

lost twice as many; how many did Harry lose? how many did John and Harry lose together?

Measure how long your finger is.

Measure how long your hand is.

Measure how broad your hand is.

How much longer is your hand than it is broad?

If you wanted to buy a dime's worth of apples, and had some half-dimes, but not a dime, what must you give to the apple-woman?

Put down two pebbles; take away half; how many have you taken away?

How many thumbs should you have if you had half as many as you now have?

If half the legs of that chair were taken away, how many would be taken away?

If your cat had half as many legs as she has now, how many would she have?

Make six marks in a row on the slate; make five under them; four under them; three under these; two under these; one under these.

Tell me all the different ways of saying two.

(Two. One one. Twice one.)

How many ways are there?

Which is the shortest way?

Half is how many times in one; or how many halves has one?

How long must I keep a puppy, who is a month old, before he is six months old?

If you had three pears for yourself and sister (or brother), and were to divide them fairly, how many should you give to her and keep for yourself?

If I were to place three nuts on the table, and were to tell you to take a third of them, how many would you take?

If I gave you two counters and Mary one, how many times more counters should you have than Mary?

How many fowls are two couples and a half?

If I were to divide a quart of milk into two parts, what would each of those parts be called? (This question is repeated to make sure that the child recollects what a pint is.)

What part of a quart is a pint?

Two pints are how many halves of a quart?

If two men had a pint of milk between them, how much would each have to drink? and how much if they had a quart of milk between them?

If three men had a quart and a pint of milk between them, how much would fall to the share of each man?

What other way is there of saying the same quantity of milk as three pints?

(A quart and a half, or a quart and a pint.)

How many quarts of milk are there in three half quarts?

How much is two added to one more than one added to two?

The only large houses in one village were the parson's house, three farmers' houses, and a gentleman's house; how many large houses were there?

Put out six counters; now add another to them; six counters and one are called seven counters.

Put out seven shells.

How many fingers of your left hand must you take with all those of your right hand to have seven fingers?

Put out seven cubes; how many twos can you find in them? how many threes? two threes and a what? How many fours do you find in seven? how many fives? how many sixes? how many sevens?

Take out six pebbles; how many shall you add to them to have seven?

Take two pebbles; how many shall you add to them to have seven?

Take four pebbles; how many shall you add to them to have seven?

Take one pebble; how many shall you add to it to have seven?

Take three pebbles; how many shall you add to them to have seven?

Take five pebbles; how many shall you add to them to have seven?

How many pebbles more than one five do you find in seven?

Do you know how many hares are called a brace? or a brace of hares?

How many hares are two brace?

What other words are there for two besides brace? (Pair, couple.)

The postman came running up to the door with a letter, the baker with a loaf, the butcher with some meat, and the grocer with some sugar; how many persons met at the door?

Five counters and how many are seven counters?

Three counters and how many are seven counters?

Two counters and how many are seven counters?

Four counters and how many are seven counters?

A farmer had two cats; one week they caught twice as many rats as themselves; how many did they catch?

Are all your fingers, without your thumbs, more or less than seven?

Have two chairs seven legs altogether, or more than seven?

Say the numbers from one to seven.

Say them back from seven to one.

How many pieces of money are there in two two-cent pieces and three cents? What number of cents are they equal to? (The very young pupil may require to count the money.)

How many things do a candle, two chairs, a table, and a stool amount to?

A boy had three buttons on each side of his jacket, but when his sister wanted to count them all, he would only let her count one side; how many buttons had he on both sides?

How many single stockings are there in a pair. In two pairs?

A man who had six fowls, sold two, lost one, and ate two; had he any left?

How many pheasants are three brace?

Make seven marks on the slate of any sort you like; cut off two; how many are left? How many are left if you cut off four? — if three? — if five?

Make four marks on the slate; how many are wanting of seven?

Make six marks on the slate; how many are wanting of seven?

Make two marks on the slate; how many are wanting of seven?

Make five marks on the slate; how many are wanting of seven?

Make three marks on the slate; how many are wanting of seven?

Make one mark on the slate; how many are wanting of seven?

Put your finger on that part of the foot measure that will mark off half a foot.

How many halves of a foot are there in this foot measure?

On what part of the foot measure must you put your finger so as to show two halves of a foot? (On the middle.)

Has this yard measure got a half? Show me the half of it?

Does a foot go as far as half-way on the yard measure?

If you wanted to measure a yard of cloth on a long piece, and had only a foot measure, how could you measure it? Show me by measuring on the floor.

A house had three windows in front, and three behind; had it more or less than seven windows altogether?

A man had four books, and afterwards bought as many as, with the four, made seven; how many did he buy?

How many times must I empty a quart jug into a tub to have seven quarts of water in the tub?

A gallon is four quarts; how many more quarts than are in a gallon would be needed to fill a seven-quart pail?

If I asked for a gallon of milk, how many quarts should I ask for?

How many shells has one oyster?

How many shells have two oysters?

How many shells have three oysters?

How many stockings are one and a half pairs?

A farmer had one riding-horse, three cart-horses, a pony, and a colt; how many horses did he keep?

Three fingers and three fingers are how many? How many more make seven?

Two fingers and two fingers and how many are seven?

Three fingers and three fingers and how many are seven?

Four fingers and one finger and how many are seven?

How many fingers and thumbs have both your hands more than seven?

Draw a triangle. How many sides has one triangle? How many have two triangles?

Make on the slate the number of marks which are one less than seven.

Make on the slate the number of marks which are two less than seven.

Make on the slate the number of marks which are four less than seven.

Make on the slate the number of marks which are three less than seven.

Make on the slate the number of marks which are five less than seven.

Try if you can, without looking, take three counters and two shells out of my hands, in which I have a number of counters and shells.

How many more eyes must you have to have seven?

A hen laid seven eggs in two months; the first month she laid three eggs, how many did she lay the second month?

Another hen laid seven eggs in three weeks; one week she laid three, the next she laid two; how many did she lay the third week, if she laid seven altogether?

There were three windows in a room, and each required two yards of holland for a blind; how much holland did the housekeeper need to buy for all the blinds?

Take seven nuts (or cubes). Tell me all the two numbers that seven nuts are equal to; tell me all the three numbers they are equal to; and all the four numbers they are equal to.

A man gave three dimes for a knife, and broke the blade, which cost him one dime and a half-dime to mend; what had this knife then cost him? (This may be first solved with the actual coin.)

There are seven days in the week; try if you can repeat their names?

A man ate one dozen of oysters for dinner every

day in a week; how many dozen did he eat in the week?

How many days would there be in the week if there were no Tuesday and Saturday?

How many days would there be less than seven in a week, if there were only Sunday, Tuesday, Thursday, and Saturday?

Four weeks are as much time as one month. How many weeks are there in half a month? How many weeks are there in a month and a half?

I have cut this square piece of paper into four; what is each of the parts called? (A quarter or a fourth of the whole piece.)

Look at this counter (or round bit of card), it has been cut into four; what is each part called? How many fourths or quarters are there in the whole counter (or card)?

Here is a foot measure. Show me half a foot. Show me a quarter of a foot.

Make a line on the slate; divide it into halves; divide it now into quarters; how many quarters did you divide each half into?

If you had to divide an apple among four persons, how much should you give to each?

How many quarters does it take to make one thing?

How many halves are there in one?

A little girl had three picture-books, and as many

were given to her as made the number of her books seven; how many were given to her?

A man read through a book a week for a month; how many books did he read?

Take out of the box without looking, four counters, two pebbles, and one shell.

How many whole days' work has a gardener done who has worked four half days?

A school-boy had two half-holidays every week; how many had he in a fortnight (or two weeks)? — how many in three weeks?

When oysters cost a cent each, how many could you buy for two two-cent pieces? — how many for two two-cent pieces and a cent? — how many for three two-cent pieces?

If oysters were twice as dear as this, how many could you buy for two two-cent pieces? — how many for three two-cent pieces?

SECTION IV.

Operations with Objects to . . . . . 8.
Operations with Names of Objects to . . 8.
Operations with Abstract Numbers to . 5.
Also with Fractions, Moneys, Weights, &c.

THE word three has three meanings; can you tell me what they are? (One, one, one. Two, one.

One, two.) Are any of these three meanings very much alike?

What are three and one called?

Four is the name of the same number of ones as two and what? — as one and what?

Say four in ones.

Can you tell me a number that is greater than two and less than four?

What numbers must I add to each of the numbers one, two, and three, in order that I may have four?

What number must I take away from four to leave three?

What number must I take away from four to leave one?

What number must I take away from four to leave two?

What number must I take away from four to leave four?

A quart is two pints; how many quarts are there in four pints? in three pints? in six pints? in seven pints?

Do you recollect how many feet there are in a yard?

How many feet are there in two yards?

How many yards are there in six feet? in seven feet? in four feet?

Put down four cubes; take away a quarter of them; how many have you left?

The fourth part, or quarter, of the legs of that chair, are how many?

Two fourth parts, or quarters, are how many legs of the chair?

Two fourths are the same as how many halves?

Four times what are equal to four?

How many times two, or how many twos, are the same as four?

Is four greater or less than three? How much greater?

What number is that which is three less than four?

Say four in "ones." How many words do you save by saying "four," instead of "one one, one, one"?

How many times three, or how many threes, are there in four? Is there exactly once three? How much is there more than once three?

Are there two threes in four? How many are wanting to make up the two threes?

What is the half of four? What is the quarter of four?

An old woman walked two miles in an hour, and her son walked four miles in an hour; how much faster did the son walk than his mother?

This old woman took three hours to walk from her village to the next town; how many miles was the village from the town?

How long would her son take to go the same distance? How long would he take to walk two miles? How long to go three miles?

A boy bought a half-dime's worth of cakes, which cost one cent each; how many were given to him for his half-dime?

At another time, the same boy bought four one-cent cakes; how many two-cent pieces would it take to pay for them?

After this he bought two one-cent and two two-cent cakes; what did he give for them?

If three cakes cost him two cents, how many should he give to another boy for one cent?

A farmer walked from his farm-house to the market-town in half an hour; his man drove some pigs to market, who were three times as long in going as the farmer; how long did the pigs take to go to market? (Three times half an hour, or a whole hour and a half.)

Seven counters and one counter are called eight counters. Put out eight counters; how many fours can you find in them?

How many twos can you put the eight counters into?

Put on the table eight nuts; how many lots of three nuts each can you find in these eight nuts? — how many nuts are wanting for you to have three lots of three each?

Put out eight pebbles; take four pebbles from these eight, how many are left?

Put out eight pebbles; take six pebbles from these eight, how many are left?

Put out eight pebbles; take two pebbles from these eight, how many are left?

Put out eight pebbles; take seven pebbles from these eight, how many are left?

Put out eight pebbles; take one pebble from these eight, how many are left?

Put out eight pebbles; take three pebbles from these eight, how many are left?

Put out eight pebbles; take five pebbles from these eight, how many are left?

Take away half from the eight pebbles, how many remain?

Eight pebbles mean the same thing as twice how many?

How many legs have a man and a horse?

How many legs have two horses?

A careless boy lost two shoe-strings in one week, and three in the next week; how many did he lose altogether?

The same boy lost three slate-pencils one week, one the following week, and two on the third week; what was the whole number that he lost? He found three of the pencils afterwards; how many had he not found then?

A little girl lost a needle every day for a week, but found two of the lost needles; how many were not found?

Four men bought a pound of tea; how much must each have for his share when the tea is divided?

Take eight cubes; can you separate them into two equal parts (or parts that are alike)? into three equal parts? into four equal parts? into five? into six? into seven? into eight?

Do you recollect what were the different equal parts that you could separate eight cubes into?

What were the equal parts that you could not separate eight cubes into?

Eight cubes is another way of saying four times how many?

I will cut this square piece of paper into three equal parts; what is each part called? (A third of the whole piece, or of the large piece.)

How many pieces has this counter been cut into? (Show the pupil a counter, or round bit of card, cut into three parts.)

How many thirds are there in the whole counter?

Bend up your forefinger; how many parts is it bent into? What should you call each part? How many thirds does it require to make the whole finger?

If you had an apple to divide between John and Mary and yourself, how much would each of you have?

What part of a yard is a foot?

What part of a yard is two feet?

(If necessary, the pupil may find out the answers to the above two questions by measuring the foot and yard measure against each other.)

Two candles of one sort weigh a pound; how many weigh half a pound? How much candle weighs a quarter of a pound?

Four candles of another sort weigh a pound; how many weigh half a pound? how many weigh a quarter of a pound? how many weigh a pound and a half?

How many lame legs must two dogs have between them if they have seven sound legs?

Two dogs, that were fighting, were run over by a coach, and each dog had two of his legs hurt; how many sound legs altogether had these poor dogs to hobble home upon?

Can you tell me what two numbers are equal to the number four? (One and three; two and two; three and one.)

Are any of these very much alike? (The first and last are the same, except that the order of the two numbers composing them is reversed.)

Do you know what three numbers are equal to the number four? (1 and 1 and 2; 2 and 1 and 1; 1 and 2 and 1.) Are these numbers alike in any respect? In what respect are they different? (These numbers are the same, but in a different order. If

necessary, the pupil may assist himself at first by placing these numbers out in counters, thus: —

• • • • • • • • • • • •

Now, can you tell me what four numbers might be put instead of the number four? (One and one and one and one.)

Four; how many times two is it?

Bend all the joints of your forefinger. How many parts are there? What is each of them called? How many thirds are there in this finger? Bend another finger. How many thirds are there in both fingers?

A man rowed himself in a boat two miles the first hour, and twice as many miles the next hour; how far did he go in the two hours?

A young apple-tree had upon it the first year one apple, next year twice as many, in the third year twice as many as on the second; how many apples did the tree produce in three years?

Into how many parts must you divide an apple, so that three people may have an equal share? What part of an apple would each of these parts be called?

How many thirds are there in one apple? in two apples? in one apple and a third?

(The pupil should have a few weights and a small pair of scales, if they can be procured; if not, several of the following exercises may be omitted.)

Try if you can weigh a pound of pebbles?

If you were to put the weight into the same scale with the pebbles, what would the weight and pebbles weigh?

Weigh half a pound of marbles; how much do the weight and the marbles weigh together?

Weigh an ounce of counters. Eight ounces are half a pound. How many ounces do the counters and the ounce weight weigh? How many ounces must be added to them to make up half a pound?

Weigh this book. What does it weigh? How much less is it than half a pound?

Half a pound weighs eight ounces; how much does a quarter of a pound weigh? A quarter of a pound is half what?

Six candles of one sort weigh a pound; how many weigh half a pound? how many weigh a third of a pound? Or supposing you asked for a third of a pound of candles which had six in it, how many would you have?

How many fingers of the right hand must you put to all the fingers of the left to have eight fingers?

Take eight shells; separate them into four equal parts; what number will each of the parts be? What part of eight will it be?

What is the fourth part or quarter of four?

Place four pebbles in a row; the one nearest you is called the first; the next one is called what? (The

second.) What is the next to the second called? What is the next to the third called?

Put three nuts in a row; what would the middle nut be called? What would those on each side of it be called?

If three boys had seven apples to divide among them, and one boy took three, how many apples would be left for each of the two other boys?

One hen had eight chickens, another hen had half that number, how many had she?

A boy went to school one hour before breakfast, three hours between breakfast and dinner, and two hours after dinner; how many hours was he in school that day? How long would he be in school on a half holiday, when he did not go after dinner?

In a row of three chairs what would the middle one be called?

A little boy had a whip, a cart, a barrow, and a spade; how many playthings had he? He had twice as many at first, but he gave half of them to his brother; how many did he give away? How many had he at first?

A snail climbed up two feet of a wall every day, but slipped back one foot every night; how many feet did he get up in three days?

A woodman felled (or cut down) four trees one day, half that number the next day, and on the third day half the number of the second day; how many did he fell on the second day? How many on the third day? How many on all three days?

A man built three houses, and a third part of them were burned down; how many were burned?

Tell me all the numbers you know less than five.

Five is another way of saying four and what?

Five is another way of saying two and what?

Five is another way of saying three and what?

What is two added to two called?

What is three added to two called?

If three be deducted (or taken away from) five, what will remain?

If one be deducted (or taken away) from five, what will remain?

If four be deducted (or taken away) from five, what will remain?

If two be deducted (or taken away) from five, what will remain?

What number is greater than two and less than five?

Two and how many halves are equal to three?

One and one and what are equal to five?

Two and one and what are equal to five?

Two and what are equal to five?

One and three and what make up five?

What is the middle number between one and three?

Can you tell me all the twos of numbers that are equal to five?

Can you tell me all the sets of three numbers that are equal to five?

Can you find two equal numbers that are equal to five? Can you find three equal numbers?

Which cost most, seven one-cent rolls, or three two-cent rolls?

A boy went up three stairs at one step or stride, but his brother pulled him back two stairs; at the next stride he went up three stairs again, but was pulled back one stair; how many stairs had he got up at last? What was the highest step that he had been upon?

SECTION V.

Operations with Objects to . . . . . 9.
Operations with Names of Objects to . 9.
Operations with Abstract Numbers to . 6.
Also with Fractions, Moneys, Weights, &c.

PUT out eight counters and one counter; eight counters and one are called nine counters. Put these nine counters back, and put out nine pebbles.

Seven pebbles and how many are nine pebbles?

Into how many threes can you separate these nine pebbles?

Try how many lots of four cubes there are in nine cubes.

Try how many lots of two cubes there are in nine cubes.

Try how many lots of five cubes there are in nine cubes.

Try how many lots of eight cubes there are in nine cubes.

Try how many lots of three cubes there are in nine cubes.

Try how many lots of seven cubes there are in nine cubes.

Draw a square on the slate; how many sides has this square? How many sides have two squares?

If you had no such word as three, or any other word for numbers, and wanted to speak of three loaves, what could you say? (Loaf, loaf, loaf.)

If there were no names for numbers, what could you say for four men? (Man, man, man, man.)

A cottager had a flock of eight geese; one market-day he sold a quarter of them; how many did he sell? how many had he left? Next market-day he sold another quarter of his eight geese; how many had he then left? How many had he sold altogether? Two quarters of the geese are the same as what part? (Half.) What part of his whole flock, then, had he sold?

Put out as many pebbles as you have heads, ears, eyes, hands, and noses.

There is a story of a giant who had a pair of two-league boots (or boots in which each step he took was two leagues long); how many steps must this giant take to go eight leagues?

If eight soldiers were standing in a row, what would you call the one nearest to you? What would you call the next, and the next, and so on to the last?

If there were a row of eight soldiers, what should I call the last one? What should I call the soldier next but one to the last?

If there were a row of trees, and the last one were called the sixth, how many trees would there be in the row?

Tell me the names of the six trees backwards, or beginning with the sixth.

In a row of five houses what would the middle house be called? How many houses would there be on each side of it?

How many cakes must I make, so that you and John and Anne shall have half a cake each?

How many cakes must I make so that six persons shall have half a cake each? Also that seven persons shall have the same quantity?

Put out nine counters (or shells); how many threes of counters must be added together to make up nine counters?

How many fours of counters must you put to-

gether for nine counters? (Two fours and one besides.) How many are wanting to make up three fours?

How many twos are equal to nine counters? (Four twos and one over.)

How many threes are nine counters?

One loaf weighs half a pound, another weighs a quarter of a pound; how much do both weigh together?

What is the shortest way of saying one, one, one, one, one?

Is there any other way, except the word "five," shorter than this?

John Smith was eight years old; his sister Mary was five; how much older was he? His brother Tom was only two years old; how much younger was he than John?

John had a cat who was twice as old as his brother Tom; how old was puss?

What is the half of two apples? of three apples?

A little boy was three years old; his sister was half as old; how old was she?

A pound of new potatoes sometimes costs two cents; how much do two pounds then cost? how much do four pounds cost? how much does half a pound cost? how much does a pound and a half cost?

Put out nine beans in a row; seven beans and how many are nine?

Put out nine beans in a row; five beans and how many are nine?

Two beans and how many are nine?

Eight beans and how many are nine?

Three beans and how many are nine?

Four beans and how many are nine?

Six beans and how many are nine?

One bean and how many are nine?

A lame horse went along a road two miles an hour; a gig horse went six miles an hour; how many more miles an hour did the gig horse go than the other? How many times as fast as the lame horse did the gig horse go?

If it be a mile and a half from the Old South Church to Bunker Hill Monument, how far is it there and back. (Places familiar to the child may be substituted.)

How much do two pints of milk cost at three cents the pint?

How much does a quart cost at three cents the pint?

How much do three pints cost at two cents the pint?

How much do four pints cost at the same rate?

How much do three pints cost at three cents the pint?

A cat caught a mouse every other day for four

days, how many did she catch? (It may be necessary to explain the meaning of "every other day" to the child.)

Another cat did the same thing for eight days, how many did she catch?

If eight eggs cost four two-cent pieces, how many two-cent pieces do two eggs cost?

Put out nine pebbles in a row; two pebbles and six pebbles and how many are nine pebbles?

Three pebbles and three pebbles and how many are nine pebbles?

Four pebbles and two pebbles and how many are nine pebbles?

Five pebbles and two pebbles and how many are nine pebbles?

One pebble and four pebbles and how many are nine pebbles?

Two pebbles and one pebble and how many are nine pebbles?

A man said to another, If you will buy of me six half-dime bundles of wood, I will give you two bundles over; how many bundles did the buyer get for six half-dimes?

How many dimes did a boy get who had a half-dime a week for seven weeks?

If candles were four cents a pound, how much money would one pound and a half cost?

If candles were four cents a pound, what weight could be bought for two cents?

A girl read two books every year for three years and a half, how many did she read altogether? (This question may be divided into three if requisite.)

Put out nine shells; if two be taken from them, how many are left?

If five be taken from them, how many are left?

If seven be taken from them, how many are left?

If three be taken from them, how many are left?

If six be taken from them, how many are left?

If one be taken from them, how many are left?

If four be taken from them, how many are left?

If eight be taken from them, how many are left?

A man earned in wages one dollar a day, how much did he earn in a week? If he paid for board two dollars and a half a week, how much had he left for other things? (It may be found necessary to perform the exercise with the coin at first.)

One ball of sewing cotton cost two cents, another cost three cents, a third cost four cents; how much did all three cost?

How much must I pay for a yard and a half of calico, at four cents the yard?

A baker left three one-cent and two two-cent rolls at a house; how much did he charge for them all?

Two bundles of fagots cost three cents; what did each cost?

Put out nine counters; now can you find any number that, when counted twice, will make nine? Can you find a number such that three of it, or three times that number, are equal to nine? Is there any number four times which, or four of which, are nine?

A little girl earned half a dime a day by picking hops; how many dimes did she get a week? What would she have got if the week had had eight working days instead of six?

How many horses does a four-horse coach need for two stages?

How many horses does a two-horse coach need for two stages?

How many horses does a three-horse coach need for two stages?

(The meaning of "stage" should, if necessary, be explained to the child.)

A man took half an ounce of snuff every day; one day he bought three ounces; how many half ounces had he? — how long did that quantity last him?

A laborer's wages were eight dollars a week, but two dollars and a half were deducted one week because he was absent part of that week; what was he paid that week? (It may be necessary to deduct the two dollars and the half dollar separately at first.)

How many stages can a two-horse coach go with six horses? — also a three-horse coach?

What is the sum or amount of two and four? (It may be necessary to vary the wording of this question, and to explain the meaning of the words "sum" and "amount.")

Three and one and what are six?

One and two and what are six?

Two and two and what are six?

How many twos, then, are there in six?

What number is that which is two less than six?

What number is that which is one less than six?

What number is that which is three less than six?

How many twos must you have to make up six? how many ones? how many threes?

Tell me all the sets of two numbers that are equal to six? Tell me all the sets of three numbers?

Tell me what four numbers you can separate six into?

A boy's wages were half a dollar a day, and a man's were four times as much; what were the man's wages?

How many pieces of money are there in a dime, two half-dimes, and three cents?

A man felled two trees which he sold for two dollars each, and three trees which he sold for one dollar each; what did he sell all these trees for? (At first this question may be separated into two if necessary.)

An old woman bought four dimes' worth of gingerbread, and sold it for half a dime more; what did she sell it for?

What is the middle number between two and six?

A man ate seven oysters at two for a cent; what had he to pay for them?

A boy drove a calf to market at the rate of two miles an hour; how many hours did he spend in going to the market, which was eight miles off?

If you were to make on the slate two marks three times over, how many marks would you have made? And how many if you had made three marks twice over?

A man gave to the poor three pounds and a half of bread; he gave half a pound to each person; how many persons did he give the bread to?

A woman went to market and bought three dimes' worth of bread, one dime's worth of salt, and two dimes' worth of potatoes; what did these things cost her?

Is six equal to any two equal numbers? — or can six be divided into any two equal numbers? — or into any three equal numbers?

Three is contained in six how many times? — or how many times can you find three in six?

If six be divided by two, or divided into twos, how many such parts will be found in it? Two, then, is contained in six how many times? For

shortness we say twos in six three times; or twos in six, three; or six divided by two gives three, that is, three times.

Twice what is six? Three times what is six?

Half six is what? A third of six is what?

When cherries are six cents a pound, how much more do they cost than when they are three cents and a half a pound?

A man paid two cents to be ferried over a wide river; he went over four times in one week; what had he to pay the ferryman?

What should I pay the butcher for half a pound of meat, if a pound cost seven cents?

A man paid two two-cent pieces twice for having his boots cleaned, and twice he paid a cent; how much did he pay altogether?

A boy's rabbits cost him, for their food, a cent for each of two weeks, two cents the next week, and three cents the last week; how much did they cost him that month? (The pupil should be told to count while the teacher recites the question.)

If there were no such word as six, what could you say instead?

What number is twice two and half of two?

If you get four dollars and two dollars, and spend three dollars, how much have you left?

SECTION VI.

Operations with Objects to . . . . . 10.
Operations with Names of Objects to . . 10.
Operations with Abstract Numbers to . 7.
Also with Fractions, Moneys, Weights, &c.

TAKE out nine cubes, or counters; add one to them; nine and one are called ten.

Separate the ten cubes into two equal parts; how many are there in each part?

How many fingers have you on both hands? — on each hand? How many fives of fingers does it require to make up ten fingers?

Separate ten pebbles into lots of two each; how many such lots can you find?

How many fingers should you have if your thumbs were away? — if your thumbs and little fingers were away?

A man had three of the fingers of one hand shot off; how many fingers had he afterwards on both hands?

Take out ten shells; take away three, how many are left?

Take away eight, how many are left?

Take out ten shells; take away two, how many are left?

Take away five, how many are left?

Take away seven, how many are left?

Take away four, how many are left?

Take away six, how many are left?

I have put out six counters; give me as many as will make up ten counters.

I have put out four counters; give me as many as will make up ten counters.

I have put out eight counters; give me as many as will make up ten counters.

I have put out two counters; give me as many as will make up ten counters.

I have put out five counters; give me as many as will make up ten counters.

I have put out three counters; give me as many as will make up ten counters.

(These exercises may be done, first by handling the counters, afterwards by looking at them placed in a row.)

A dog jumped on a baker's cart, and stole a one-cent role twice every week during a month. The baker could never catch him, but at last found out where his mistress lived, and complained to her. She agreed to pay for what the dog had stolen; how much ought she to pay?

Two little girls earned a dollar a week each by wrapping buttons up in paper for a button-maker, and their older sister earned one dollar and a half a week; how much did the three girls earn a week towards the support of their family?

A woman bought a two-cent loaf, a three-cent loaf, and a four-cent loaf; what did they all cost?

How many weeks are there in two months?

How many months are there in six weeks?

How many weeks are there in a month and a half?

How many weeks are there in three quarters of a month?

How many weeks are there in a month and a quarter?

What part of a month is a week?

What part of a month is a fortnight?

What part of a month are a week and a fortnight together?

One dog had six puppies, another had three? how many puppies remained of the whole number after four had been drowned?

Take out ten shells; how many twos can you divide them into?

How many fives can you divide them into?

How many threes can you divide them into?

How many eights can you divide them into?

Take out ten shells; how many fours can you divide them into?

How many sixes can you divide them into?

How many ones can you divide them into?

How many nines can you divide them into?

A woman bought eight cups and saucers; her servant broke two, and her little boy broke three; had she any left then?

A mother gave eight apples to her eldest daughter to divide with her two brothers and one sister; how many should each of the four children have? If only four apples had been given, how many should each child have had? How many if two apples had been given? If one had been given?

If I were to divide an apple into eight parts, what would each part be called?

How many pages of a book should you read in a week if you read one a day? And how many if you read half a page a day?

A boot-maker sent nine pairs of shoes, costing one dollar each, to a shopkeeper, who sent back three pairs; what had that person to pay for the boots he kept?

Seven pebbles and what are ten?

Three pebbles and what are ten?

Eight pebbles and what are ten?

Nine pebbles and what are ten?

Five pebbles and what are ten?

Two pebbles and what are ten?

Four pebbles and what are ten?

One pebble and what are ten?

Six pebbles and what are ten?

A farmer had nine acres of wheat, and at harvest time he reaped three acres a day; how many days did he require to reap all his wheat?

How many weeks are there in a month and a week?

A horse had three times as many as three nails in one of his shoes; how many nails were there in the shoe?

Two children were christened in a church each Sunday for a month; how many were christened that month?

Take out ten cubes and put them in a row; five cubes and four cubes and what are ten?

Three cubes and five cubes and what are ten?

Two cubes and four cubes and what are ten?

Six cubes and one cube and what are ten?

Two cubes and two cubes and what are ten?

Three cubes and three cubes and what are ten?

Four cubes and three cubes and what are ten?

A pedlar bought three two-dime books, and sold them for three dimes each; how much profit did he

make by the books? (The child should be told that "profit" means money made for the trouble of buying and selling again, and often including the trouble and expense of carriage from one place to another.)

A man set two watchmen to guard his warehouse eight hours every night; they watched by turns, and one relieved the other every two hours; how long did each man watch?

A wooden pile, or post, was driven three feet into the bottom of a river, two feet more were covered with water, and three feet were above water; how long was the post from top to bottom?

A man went to market every day one week; how many times did he go? He went every other day the next week; how often did he go? How many times had he been in the whole fortnight?

A carpenter made two small tables for a half-eagle, two larger tables for an eagle each, and a larger one still for two eagles; how many half eagles did all the tables cost?

If you are now five years old, in how many years shall you be eight?

When you are seven years old, how long will it be before you are ten?

A parson preached two months and one week at a church; how many weeks did he preach?

Put out ten shells: ten shells is a short way of saying five shells and how many?

Ten shells is a short way of saying three shells and how many?

Put out ten shells; ten shells is a short way of saying eight shells and how many?

Ten shells is a short way of saying four shells and how many?

Ten shells is a short way of saying two shells and how many?

Ten shells is a short way of saying six shells and how many?

How many half-dollars are there in three dollars? in four and a half dollars?

What number of dollars are eight half-dollars equal to?

How many dollars and half-dollars are there in a half-eagle?

A box of paints had nine cakes of color; each cake cost half a dime; how many dimes did all the cakes of color cost?

How many sermons does a clergyman preach in a month if he preaches two every Sunday?

If a clergyman preached three sermons every Sunday, how many Sundays will he take to preach nine in?

How many half-dimes are left when four dimes are taken from nine dimes?

A penknife, with six blades, cost half a dollar; how many dollars would five such knives cost?

Put ten counters in a row; put other ten counters

in two rows ; put other ten counters in three rows ; which of these three ways shows you most quickly that there are ten counters ?

Put ten counters into four parcels in as many ways as you can.

Put ten cubes in a row ; now tell me all the three parcels that will make up ten.

Take out five cubes ; if each of these cubes were divided into two, how many half cubes should you have ?

How many joints are there in your middle and forefingers less than ten ? — in your middle finger ? in your forefinger and thumb ?

Five bones were thrown out to a dog ; as he was gnawing them comfortably, another dog came up and attempted to seize a bone, and both dogs began to fight. While they were fighting, two other dogs came up, and ran off with a bone apiece ; how many bones were now left to their owner to fight for ?

Seven is a name for as many ones as six and what ?

Five and what are names for the same number of ones as seven ?

Seven means as many ones as four and what ?

What are two and three called ? What would they be called if two were added to them ?

How much is six less than seven ?

Four is how many more than one, and less than seven ?

Take two from seven, and how many are left?

Take four from seven, and how many are left?

Take six from seven, and how many are left?

Take three from seven, and how many are left?

Take five from seven, and how many are left?

Take seven from seven, and how many are left?

Six and what are seven?

Four and what are seven?

Two and what are seven?

Five and what are seven?

Three and what are seven?

A tall man's steps were each of them a yard wide; his little boy's steps were a foot wide; how much wider were the father's steps than the son's?

A woman put a half-eagle every month into the savings-bank; how many half-eagles had she there at the end of nine months, and how many eagles?

Another woman did the same thing, but took back one and a half eagles; how much had she in the bank at the end of the nine months?

Take this yard measure, and try if you can find out how many yards this room is long. Now find out how many yards it is broad. How many yards is it longer than it is broad?

How many dimes must I pay in a week for a pint

of strawberries every day, when strawberries are two dimes a quart?

Two and four and what are seven?

Five and one and what are seven?

Three and two and what are seven?

Two and one and what are seven?

Four and one and what are seven?

Two and two and what are seven?

One and three and what are seven?

A carter, who went with his cart from Boston to the country, paid two cents at the first toll-gate, three cents at the next, and three cents at the third gate; what did he pay that day in tolls? (The word "toll" should be explained to the child, if he does not understand it.)

A man ate half a dime's worth of potatoes every day with his dinner; how many dimes did he pay for them in nine days?

Three of a soldier's fingers and one of his thumbs were torn off by the bursting of a gun; how many fingers and thumbs had he left?

How many persons have among them ten eyes?

There were six showers one day, and four the next; how many were there in both days?

One day there were three showers; one lasted two minutes, another one minute, the third six minutes; how long did it rain that day?

Say every number from one to ten.

Say every other number to ten, beginning with one.

Say every other number to ten, beginning with two.

Say every number from ten to one.

How many ones are there in seven?

How many twos are there in seven?

How many sevens are there in seven?

How many sixes are there in seven?

How many fives are there in seven?

How many fours are there in seven?

Seven are how many times two?

A man has a flock of ten sheep; he wants to keep three only; how many must he sell that he may have three only?

How many times ten fingers have four persons got?

A boatman had five customers one day, two the next, one the next, and one the fourth day; how many had he during these four days?

Tell me all the two numbers that are the same as seven?

There were two hens belonging to a cottager; one had eight chickens, the other had two; how many chickens had both hens, and how many had the one hen more than the other?

A man who had to write all day long, used up two pens one day, four the next, and three the next day; how many pens did he use in three days?

Tell me all the sets of three numbers that are the same number of ones as seven.

A drawing-master drew a set of pictures in pencil, in which he used up two soft pencils, three hard pencils, and three middling pencils; how many pencils did he use?

How many single words do you know that mean the same number as two? (Couple, pair, brace.)

A man who had three children, bought them a bun apiece one day, and two buns apiece the next day; how many buns did he buy for them altogether? How many did he buy for each child? What did they cost at a cent each? What would they have cost at half a cent each?

How many feet are there in a yard? — in two yards? — in three yards?

A chest of drawers had five drawers; each drawer had two handles; how many handles were there in the whole chest of drawers?

SECTION VII.

Operations with Objects to . . . . . 11.
Operations with Names of Objects to . 11.
Operations with Abstract Numbers to . 8.
Also with Fractions, Moneys, Weights, &c.

PUT out ten cubes; put out one other cube; ten cubes and one are eleven cubes. Put the cubes back, and put out eleven pebbles. Put the eleven pebbles in two rows; can you put them in two equal rows? Try, now, if you can put them into three equal rows, and into four equal rows. When you can put a number into two equal rows, that number is called an even number. Is eleven an even number? Is two an even number? Is five an even number? Is six an even number? Is three an even number? Numbers that cannot be put into two equal rows are called odd numbers. Is one an odd number? Is four an odd number? Is seven an odd number?

A lady had two large, two small, and six common-sized table-cloths; how many were there in her whole set?

A man had ten pairs of boots; on looking them over he found that half were quite worn out, and he sent them away; how many pairs did he keep?

How many yards are there in three feet? — in six feet? — in nine feet? — in four feet? (a yard and a foot, or a yard and a third) — in seven feet? — in eight feet? — in ten feet?

A chest of drawers contained four drawers; two of the drawers had two handles each, and two of the drawers had three handles each; how many handles were there altogether?

Put out eleven shells; take away seven, how many are left?

Take away five, how many are left?

Take away nine, how many are left?

Take away two, how many are left?

Take away six, how many are left?

Take away eight, how many are left?

Take away three, how many are left?

A servant, who was carrying the dinner up-stairs, fell down, and broke several of the plates and dishes; she was carrying up six plates and four dishes, and broke half of each; how many were broken altogether?

One boy had five sisters, another boy had two sisters for each one that the first boy had; how many sisters had the second boy?

A woman bought ribbon for a pair of shoe-strings for her husband; she bought a foot of ribbon; how much did she put in each shoe? If she had bought ribbon for three pair of shoes, how many feet of rib-

bon would she have? How many half feet of ribbon would that be? How many yards of ribbon would that be? How many half feet of ribbon are there in a yard?

Tell me all the even numbers between one and ten.

Tell me all the odd numbers between one and ten.

Put out eleven beans; what number of beans must you add to nine beans to have eleven?

What number of beans must you add to six beans to have eleven?

What number of beans must you add to two beans to have eleven?

What number of beans must you add to five beans to have eleven?

What number of beans must you add to three beans to have eleven?

What number of beans must you add to seven beans to have eleven?

What number of beans must you add to eight beans to have eleven?

What number of beans must you add to four beans to have eleven?

A horse ate one day six cents' worth of oats, two cents' worth of beans, and two cents' worth of hay; what did he cost his master that day?

A child slept ten hours, his father slept four hours less; how long did the father sleep? The child's

mother slept two hours less than the child; how long did she sleep?

Two boys had ten apples given to them; how many were given to each?

Five boys had ten apples given to them; how many were given to each?

How many gallons are there in eight quarts? — in six quarts? — in ten quarts?

If a dozen of eggs cost four dimes, what will a dozen and a half cost? — what will two dozen cost? — what will three dozen cost? — what will two dozen and a half cost?

A carpenter gave his son ten dollars to divide among his five workmen, to pay them for their day's work; what sum should the son pay to each workman?

What numbers are less than eight, and greater than five?

What number is that which is one less than eight?

What number is that which is four less than eight?

What number is that which is six less than eight?

What number is that which is two less than eight?

What number is that which is five less than eight?

What number is that which is three less than eight?

What number is that which is seven less than eight?

What is the middle number between four and eight?

A dog stole a pound of meat from a butcher's shop; as he was running along with it, another dog made a snatch at it, and tore half of it away; he still ran on, when a second dog chased him, and tore away half of what was left; how much of the stolen meat did the dog manage to eat quietly at home?

Four and one and two are what?

Two and six are what?

Two and two and two are what?

Three and five are what?

Two and one and three are what?

Four and four are what?

Three and two and three are what?

One and five and one are what?

Two numbers added together are eight; one of them is five, what is the other? If one is two, what is the other?

A man gave his eldest son four sheets of paper, to the next he gave three sheets, to the next son two sheets, to the youngest one sheet; how many sheets did he give to all? How many more sheets had the oldest than the youngest? How many sheets had all excepting the oldest? How many sheets had all excepting the second? How many sheets had all excepting the second and third?

How many half-dimes are there in four dimes? —

in five dimes? — in five dimes, if two dimes be taken from them?

A milkman left a pint and a half of milk at two houses; how many pints of milk did he leave at both?

How many fours must you have to make up eight?

How many twos must you have to make up eight?

A woman sent her little daughter with ten eggs to her aunt; the little girl dropped her basket and broke half; how many did she carry safe?

A man went five miles by a coach, and was charged two cents a mile; how much did he pay for the whole of his journey?

A boy ploughed half an acre of land every day for three days; how many acres did he plough in that time?

A man ploughed an acre and a half a day for three days; how much did he plough altogether? — how much more than the boy?

How many candles, five to the pound, should you have if you bought two pounds? how many would there be in half a pound?

How many dimes are there in a half-dollar? how many in two half-dollars?

How many pints are there in four quarts?

How many quarts are there in ten pints?

What number is left when three is taken from eight?

What number is left when five and two are taken from eight ?

What number is left when one and two and three are taken from eight ?

What number is left when six and two are taken from eight ?

What number is left when one and one and one and two are taken from eight ?

Four times two are how many times one ?

Four times two are how many times four ?

Tell me three numbers that are equal to eight.

Tell me another set of three numbers that are equal to eight.

Tell me some four numbers equal to eight.

One day a doctor rode two miles to see a sick man, and back again; and he rode three miles to see a child that was ill, and back; how many miles did he ride that day ?

A man gave four dimes to all his children ; to the two eldest he gave a dime each, to the rest he gave a half-dime each ; how many children did he give a half-dime to ? How many children had he altogether ?

A man and his wife were charged by a stage-coachman a half-dime a mile ; how many dimes did they pay for being conveyed (or carried) ten miles ?

A man, who was walking a long way on a hot

day, drank three pints of milk and two half-pints; what did he pay for all his milk, at two cents a pint? — how many pints did he drink? — how many quarts?

What is the fifth part of five apples? — of ten apples?

A family bought ten pecks of coals, and used a fifth part one week; how many pecks did they use in that week?

How many chairs would there be in this room if there were four times as many as two?

Put out three sets of eleven counters. Divide the first set as nearly as you can into two equal parts; divide the second set as nearly as you can into three equal parts; and divide the third set as nearly as you can into four equal parts.

Put out eleven counters in such a manner as that a person could tell most quickly, and with least counting, that there are eleven.

How many times ten fingers have you and John?

How many times ten fingers have you and John and Mary?

How many times ten are your fingers and toes?

A wagon had six horses, but as many more horses were put to it as made ten, to enable it to go up a very long steep hill; how many more horses were added to the wagon?

It required two skins with fur on them to cover a

fur cap, and five times as many to cover a muff; how many did the muff require? — how many more did the muff require than the cap?

What number is three times two?

What number is two times four?

What is the half of four? — of eight?

How many times is two contained in four?

How many times is two contained in eight?

How many times is four contained in four?

How many times is four contained in eight?

How many times is two contained in six?

What two equal numbers are eight?

Are any three equal numbers eight?

Are any four equal numbers eight?

How many are eleven more than all your fingers on both hands?

Twice how many pints of milk are ten pints?

Five times how many gallons of beer are ten gallons?

A basket-maker agreed to supply a toyshop-man with small baskets at one dime each, but promised to give him five baskets for the price of four; the toyman took ten baskets; what did he pay for them?

How many more chickens had a hen with eleven than a hen with eight?

A geranium, that was planted one year, shot up, the next spring, one inch the first month, three inches the next month, and two inches in each of the two next months; how many inches had it grown altogether?

There were six cows on a farm, and the farmer bought as many more as made up the number to eleven; how many did he buy?

A traveller told his son to guess how many miles he had walked that day; for he had walked three miles and sat down, then two miles, then two miles again, and then three miles, which brought him to the end of his journey.

A butcher was ordered to send nine pounds of meat to a family, and he sent eleven; how many pounds did he send that he ought not?

There were three wheels in a machine; while the great wheel went round once, the next wheel went round three times; how much oftener did the second wheel go round than the first? The third wheel went round twice for once that the second wheel went round; how many times did it go round for one going round of the big wheel? (This question may be done at first with counters.)

Have two horses eleven legs? — how many more or less have they? Have three horses eleven legs? how many more or less have they?

An Italian image-boy started one morning with eleven images; he sold four that day, and three the next day; how many did he come back with?

If you are now six years old, in how many years will you be ten?

Two women had eleven children; one woman had five, how many had the other woman?

A laborer had eleven fagots to carry from the wood to his cottage; he could not carry them all at once; how ought he to divide them so as to carry nearly equal quantities at two journeys?

SECTION VIII.

PUT out eleven counters or cubes; add one to them; eleven and one are called twelve cubes.

Put out ten pebbles; put out as many to them as shall make twelve.

There is another word for "twelve;" it is "dozen." Put out a dozen shells. Put these shells into two equal parts, if you can. What is the number, or amount, of shells in each of these parts? What part of a dozen are six? What is another name for six, then? (Half a dozen.)

Take this foot measure; show me how much is half a foot. Can you find how many inches there are in the half foot? How many inches are there in the whole foot? How many inches more than half a foot are eleven inches?

Eleven barges wanted to get through a lock, but only three could get through at a time; how many times must the lock be filled with water for the eleven to go through? (If a "lock" be not understood by, or cannot be explained to, the pupil, this question may be omitted.) How long would the eleven barges take to get through if each set took a quarter of an hour? Could more than eleven have got through in an hour?

If we say that a stick or a stone is a foot long, how many inches long must that stick or stone be? Foot is a word which means what? (Twelve inches.)

I saw eleven mules going along a road; four were yoked to one cart, the rest carried panniers; how many carried panniers?

How many mules would require eleven panniers?

Put out twelve counters; take away eight, how many are left?

Take away three, how many are left?

Take away six, how many are left?

Take away two, how many are left?

Take away nine, how many are left?

Put out twelve counters; take away five, how many are left?

Take away four, how many are left?

Take away seven, how many are left?

Take away ten, how many are left?

A fathom is the name for six feet in length; measure a fathom on the floor. How many yards are there in a fathom? How long is a piece of string that is half a fathom long? Is a rope that is two fathoms long more or less than eleven feet long?

Eleven young turkeys went out into the fields, and only seven returned; how many were lost?

Place twelve pebbles on the table; six and what other number are equal to twelve?

Ten and what other number are equal to twelve?

Eight and what other number are equal to twelve?

Eleven and what other number are equal to twelve?

Seven and what other number are equal to twelve?

Nine and what other number are equal to twelve?

Four and what other number are equal to twelve?

Two and what other number are equal to twelve?

Five and what other number are equal to twelve?

Three and what other number are equal to twelve?

How many feet are there in two fathoms?

A small curtain required two rings to fasten it up with; a larger curtain required twice as many all but one; how many rings did the larger curtain require? how many did both curtains require?

Put out twelve shells, and tell me how much six and three and one want of being twelve.

Tell me how much four and four and three want of being twelve.

Tell me how much one and six and two want of being twelve.

Tell me how much five and two and three want of being twelve.

Tell me how much four and two and one want of being twelve.

Tell me how much two and two and three want of being twelve.

Tell me how much one and two and one want of being twelve.

Tell me how much three and four and one want of being twelve.

Take the foot rule or measure; how many inches do you find in each half of it?

Try if you can find out the four equal parts into which the foot measure might be divided. How many inches are there in each of these parts?

If the foot measure were divided into three equal parts, how many inches would each part contain?

How many inches would there be in each part, if the measure were divided into six equal parts?

A man who worked for a farmer had eleven bottles of beer given to him; how long would this beer last him if he drank two bottles a day?

A man bought twelve bundles of fire-wood; he carried home five, his son carried home three; how many bundles had he to fetch away next day?

There were three windows in a room, two of them had four panes of glass each, the third window had one pane less than the other two; how many panes had this last window? — how many panes had all three windows?

A man bought a dozen pairs of gloves, but returned five pairs; how many pairs did he keep?

How many fewer candles are there in a pound of sixes than in a pound of eleven candles?

How long is a man's shoe that is two inches less than a foot long?

In one field there were three dozen crows, in another field five dozen, in the third field as many dozen as, with the former, made twelve dozen crows; how many crows were there in the third field?

Take out a dozen pebbles; how many ones can you find in them? — how many twos can you find in them? — how many threes? — fours? — fives? — sixes? — sevens? — eights? — nines? — tens? — elevens? — twelves? Which of these numbers are contained exactly in twelve? Which of them are

not contained exactly in twelve? Is it the odd or even numbers that are contained exactly in twelve? and which kind of numbers are not contained exactly in twelve?

Is twice any number of these pebbles exactly twelve?

Is three times any number of these pebbles exactly twelve?

Is four times any number of these pebbles exactly twelve?

Is five times any number of these pebbles exactly twelve?

Is six times any number of these pebbles exactly twelve?

Put out twelve counters, and find out what number is the half of them — the quarter of them — the third — the sixth.

A man's foot was twelve inches long and five inches broad; how many inches was it longer than it was broad?

A cottager sold one day four of his eleven geese, next day he sold two, and the day after that he sold three; had he sold all? — how many had he sold? how many were left?

How many chickens had a hen in three years, who had four in each year?

A nobleman, who kept several gardeners, had one gardener cutting vines, two sweeping walks, and

four digging; the remaining two were planting trees; how many gardeners did this nobleman employ?

Eight gallons are called a bushel; how many gallons are there in half a bushel? — in a quarter of a bushel?

In twelve quarts how many gallons?

In twelve pints how many gallons?

A man has nine animals in his house; a third are cats; how many cats has he? Half the remainder are dogs; how many dogs has he?

A pencil that was six inches long, had lead halfway up; how many inches did the lead go up? how many such pencils have altogether one foot of lead?

What number do five and four amount to?

If you add two to six, what is the sum?

The word total means "whole number." What is the total of three and six?

What is the whole number of which five and two and one are the parts?

What is the amount of three and three and three?

The sum, or total, of two and five and two is what?

What is one and one and seven?

What number and two are equal to nine?

What number and five are equal to nine?

What number and three are equal to nine?

What number and seven are equal to nine ?

Nine is one word for four and what ?

Nine is one word for six and what ?

Take three from nine, and what is left ?

Take one and four from nine, and what is left ?

Take three and two and one from nine, and what is left ?

What number is that which is four less than nine ?

What number is that which is two less than nine ?

What number is that which is seven less than nine ?

What number is that which is nine less than nine ?

What number is that which is three less than nine ?

What number is that which is one and three and two less than nine ?

What number is that which is two and five less than nine ?

Twelve sacks of coal hold as much as one chaldron ; how many sacks hold half a chaldron ? how many hold a quarter of a chaldron ?

Twelve dozen are called a gross ; how many dozen knives are there in half a gross ? — how many dozen in a quarter of a gross ?

How much did a man pay for half a dozen cigars, at two cents each ?

Say every other number to twelve, beginning with one.

Do the same backward, beginning with twelve.

Say every third number, beginning with one, and going to twelve. (One, four, seven, &c.)

Do the same backward, beginning with twelve.

A cow and a sheep and a lamb had some turnips given to them; the cow ate twelve, the sheep half as many, and the lamb ate half as many as the sheep; how many did the sheep and lamb eat? — did both of them eat as much as the cow?

A year is as much time as twelve months; how many months are half a year; how many are a quarter of a year?

A laborer earned twelve dollars a week; he paid two dollars a week rent for his house and garden, and five dollars a week for bread and meat; how much a week had he left to buy other things with?

What number is three times three, or three threes?

Is twice any number nine? Twice what is the nearest number to nine?

Is four times any number nine?

Is any number half of nine? — a third of nine? a quarter of nine?

Threes in nine, how many? or, how many times is three contained in nine?

How many dimes are there in five half-dimes? in nine half-dimes? — in twelve half-dimes?

How many miles an hour faster does a horse go at ten miles an hour, than a man at three miles an hour? Also, if the horse goes twelve, and the man four miles an hour?

How many dimes are of as much value as twelve half-dimes?

How many half-eagles are there in four and a half eagles? — in six eagles? — in five and a half eagles?

A boy was sent to the grocer's to buy a pound of seven-cent sugar; what change (that is, what number of cents) should he bring back? He went with a dime.

An acre is the name given to a large piece of ground of a particular size; a rood is a name given to a smaller piece of ground; there are four roods in one acre. Now make a square on the slate; if this square stand for an acre, how could you divide it into roods? How many roods are there in two acres? in three acres? — in half an acre? — in an acre and a half? — in two and a half acres? — in a quarter of an acre? — in an acre and a quarter?

A boy took to the post-office two letters, for each of which two cents was to be paid, and a book on which the postage was five cents, and another letter charged three cents; how much did the postage on all these cost? (It should be explained to the child that postage means money paid for carrying letters.)

The wheel of a cart had twelve spokes; a quarter of them were broken by the wheel running against a post; how many were left?

Four quarters make up, or are, as much as one yard; how many quarters are there in two yards? in three yards? — in half a yard? — in a yard and a half?

What are the numbers between four and ten? how many of them are there?

Eight and what are ten? — also, six and what? two and what? — seven and what? — five and what? three and what? — four and what?

Take two from ten, and what are left?

Take two from seven, and what are left?

Take two from four, and what are left?

Take two from eight, and what are left?

Take two from three, and what are left?

Take two from six, and what are left?

Take two from three and four, and what are left?

Take two from one and two and three, and what are left?

In one hour a toll-gate keeper took a dollar for a large flock of sheep, two dollars and a half for a drove of bullocks, and half a dollar for some pigs; and he paid the baker one dollar and a half which he owed for bread; how much more money had he at the end of the hour than at the beginning of it?

If I add five to five, and take four away, how many remain?

If I add six to three, and take five away, how many remain?

If I add four to four, and take seven away, how many remain?

Tell me two numbers that are equal to ten.

Tell me other two numbers that are equal to ten.

Tell me three numbers that are equal to ten.

Add five to four, take two away, and add three; what number do you find?

A bricklayer, who was building a house, was allowed, every day, half an hour for breakfast, an hour for dinner, and half an hour for tea; how many hours a day did he work? — how many hours would he have worked at that rate in half a day?

Three bushels fill one sack of coals; how many sacks do twelve bushels fill?

What part of a chaldron are four sacks? (There are twelve sacks to a chaldron.)

An ell is longer than a yard; it is five quarters long; how many quarters are there in two ells? — how many quarters in half an ell? (Two quarters and a half.)

A man had six pairs of stockings; he wore out two pairs a month; how long did the half dozen pairs last him?

If I receive twelve pens, and use three a day, how long will the dozen last me? — and how long if I use two a day?

What is the middle number between six and ten?

What is the middle number between four and ten?

What two numbers can you subtract, or take away, from ten, so as to leave six? — so as to leave four?

Will any two equal numbers, added together, be ten?

Will any three equal numbers, added together, be ten?

Will any four equal numbers, added together, be ten?

Will any five equal numbers, added together, be ten?

How many partridges are a brace and a half?

How many partridges are three braces and a half?

Ten is equal to twice what? — to five times what?

What must you add to twice four to equal ten?

What must you add to three times two to equal ten?

If ten be divided by two, that is, into twos, how many twos will there be?

Can ten be divided exactly by three, or into threes?

Can ten be divided exactly by four, or into fours?

Can ten be divided exactly by five, or into fives?

How many apples are there in half a dozen? — in a quarter of a dozen? — in a third of a dozen? How many in two quarters of a dozen? How many in two-thirds of a dozen? How many in four quar-

ters of a dozen? How many in one-sixth of a dozen?

If a horse can carry two hundredweight of sand, how many horses would be needed to carry as much as a cart which holds twelve hundredweight?

If a strong mule can carry twice as much as a horse, how many strong mules would be needed to carry the twelve hundredweight?

If a dozen apples be divided between two boys, how many will each have? — if among three boys, how many apples will fall to the share of each? also, if among six boys? — if among twelve boys? if among eight boys?

Two dray-horses in one dray, draw three butts (or large casks) of porter; how many horses would be needed to draw twelve butts at the same time? how many drays would be needed for the twelve butts?

If there were no such word as ten, what could you say instead?

Could you say the same number as ten, by using twelve with some other words? (Twelve less two; or twelve when two are taken from them.)

What does a quarter of a pound of fine sugar cost, if one pound costs twelve cents? What does one-third of a pound cost at that rate? What do two-thirds cost? What do two quarters cost? What does one-sixth of a pound cost? What do two-sixths cost?

A man, who was shingling a roof, did a quarter one day, and a quarter the next day; how much still remained to be done? — how long would he take to shingle the whole of the roof?

SECTION IX.

Operations with Names of Objects to 12.
Operations with Abstract Numbers to 12.
Figures taught to . . . . . 5.
And Operations in Fractions, Moneys, Weights, &c.

Look at this mark which I have made on the slate — **1**. This mark stands for "one;" when persons see this mark they think of "one." It is called a figure of one, or a figure for one. Try to make this mark on your slate. When you see this mark "1," what are you to think of? Make marks of this kind for one, one; for one, one, one.

An officer was marching with twelve soldiers; first he put the soldiers in three rows; how many soldiers were in each row? When the road became narrower he put them into four rows; how many were then in each row? When the road became narrower still he put them in six rows; how many were then in each row? (If necessary, this exercise may be first performed with counters.)

How much, in ones, are three halves? — six halves? How many halves are three ones?

There were four windows of a house which wanted cleaning; how long would a man take to clean them all who took half an hour to clean each? How many men would be needed to clean all the windows in an hour?

How many pairs of gloves have you if you have twelve single gloves?

A gentleman bought a dozen bottles of wine, but he did not like it, and returned half of it at one time, and three bottles at another time, the rest he had drank; how much had he drank?

Show me what mark or figure you are to make for "one." When we want to make a single mark for "two," we make this mark or figure, **2**. Try if you can make it. Try again. What is the use of this figure or mark, 2? If you had not this figure 2, but only this figure or mark 1, how could you mark two? If you could not see, would this mark or figure, 2, make you think of "two"? Suppose I had made this mark, 2, and nobody had ever told you that you were to think of "two" when you saw it, should you have thought of "two" as soon as you saw me make it? Is this mark or figure two things? 2. How many things or marks is it? How many things or ones does it signify or make you think of?

A cow, for a while, gave twelve quarts of milk a day; afterwards she gave three less than twelve; and after that five less than twelve; how many quarts

did she give at the end of the second and third period?

How long would a man take to walk twelve miles, if he walked four miles an hour? — if he walked two miles an hour? — if he walked three miles an hour?

If two be taken from eleven, what remains?

If four be taken from eleven, what remains?

If six be taken from eleven, what remains?

If eight be taken from eleven, what remains?

If five be taken from eleven, what remains?

If seven be taken from eleven, what remains?

If three be taken from eleven, what remains?

If nine be taken from eleven, what remains?

Make the figures for one and two.

If I were a great way off, and you wanted me to think of two, and could not see me, or get near to the place where I was, what could you do to make me think of it? If I were in the dark, could you let me know of it by writing a figure? If I were blind, could I know of it by your writing a figure? If you wanted me to think of two, now, tell me all the ways by which you could make me think of it.

A farmer who was going to market, desired his boy to drive some pigs there. The farmer and pigs set off at nine in the morning. The farmer got to market at half past nine, but the pigs were three

times as long on the road. At what hour did the pigs get to market?

What is the remainder of eleven less two? or of eleven after two has been deducted?

What is the remainder of eleven less five and one?

What is the remainder of eleven less four and three?

What is the remainder of eleven less two and six and one?

Add to nine a number that will make it eleven.

Add to six a number that will make it eleven.

Add to eight a number that will make it eleven.

Add to five a number that will make it eleven.

Add to two a number that will make it eleven.

Add to four a number that will make it eleven.

Add to seven a number that will make it eleven.

The cow that gave twelve quarts of milk a day, had afterwards a calf that sucked all the milk; in a little while the owner of the cow fed the calf, and would only let him suck half the milk, and afterwards only a third; how much of the milk did the farmer get when the calf had a half and a third?

Tell me two other numbers, the sum or total of which is the same as the sum of three and six.

Eight ounces are half a pound; how many ounces are a quarter of a pound?

Twelve hours are a day; how many hours are half a day? — a quarter of a day? — a third of a day? — two quarters of a day? — two thirds of a day?

How many stages could a man, who had twelve horses, convey a four-horse coach? — a two-horse coach? — a three-horse coach? — a coach and six?

Do second and two mean the same thing?

How many ones does three mean?

How many ones does third mean?

How many thirds are in one?

How many ones are in six thirds?

How many ones are in four thirds?

How many thirds are in three ones?

How many thirds are in one and a third?

How many inches must be added to five to make a foot? — how many to three inches? — to seven? to four?

How many times as fast does a horse go, at eight miles an hour, as a man does at four miles an hour? a horse at twelve miles an hour, as a man at four? a horse at twelve, as a man at three?

An old fox stole a fowl from a farmer's hen-roost every month; how many did he steal in half a year? What was the farmer's loss if the stolen fowls were worth three quarters of a dollar a pair?

Can you read this word "one"? Make the figure

for one. Which is the shortest way of writing one, to make the figure 1, or to write the word "one"? How many letters are there in the word one? How many marks are there in the figure for one? (This exercise, of course, cannot be fully performed unless the pupil can read.)

Can you read this word "two"? Try if you can make the mark or figure that makes persons think of the same thing as the word two.

A wagon took five days to go a hundred miles, and a mail-coach went the same distance in one day; how many times as fast did the mail go as the wagon?

Do any two equal numbers amount to eleven? What two equal numbers amount to a number that is nearest eleven? (5 or 6.) Is twice any number eleven? Is thrice any number eleven? Twice what number and three are eleven?

A man paid four eagles a year rent for his house; how much did he pay for a quarter of a year? Another man paid eight eagles a year rent for his house and garden; what did he pay for a quarter? Another man paid twelve eagles a year rent for his house and shop; what did he pay for a quarter? This last man paid also four eagles a year taxes; how much were his rent and taxes for a quarter?

A servant lived one year in a place; her wages were eight eagles a year; she had been paid for one quarter of a year; for what part of the year had she

not been paid? How much had she been paid? what was owing to her?

For every half mile that a man went, a horse went a mile; how many times as fast as the man did the horse go? A horse went a mile for each quarter of a mile that a man went; how many times faster did the horse go? How many times slower did the man go than the horse? If the last man went two miles an hour, how many miles an hour did the horse go?

A man who bought a quantity of carpet for his new house, had two yards left; his wife said, I should like some to cover some stools; but the man told her he could not spare all, and asked her how much she wanted; she said, I have three stools to cover, two will need a foot each, and one a foot and a half of carpet. If she covered the stools, how much would she leave her husband?

How much are two halves less than six halves? How many ones is the difference equal to? How much are three halves and two halves? How many ones are they?

Twelve is how many words? We may use it instead of the two words five and what? We may also use it instead of the three words, four and three and what?

What single name could you use instead of the four names — four, three, two, and three? (Twelve.)

Try if you can say twelve in ones? Instead of one

word "twelve," how many words must you then say?

A man bought four dozen of oranges, but put them in a basket with a hole in it, and lost two out of every dozen before he got home; how many had he lost? How many dozen oranges did he take home?

When we want to write quickly, or to make a small mark that shall cause others to think of three, we make this mark, **3**. Try and make it. Try again. (If there are several pupils, each should make the figure.)

What word is this "three"? Which takes most time to write, the figure 3, or the word three? How many letters does the word three contain?

Does the figure for three contain one mark or letter, or more than one?

If you and I were in the dark, and I wanted to make you think of three, what should I do? If I were to put three counters on this table, could you tell how many there were in any other way than by looking? If I were to put three bits of cheese on the table, could you tell by the smell that they were three? Could you tell by the touch? Could you tell by the sight? Could you tell by listening to the cheese?

Make the figures for one, two, and three.

Which is cheapest, butter at ten cents the pound, or at four cents the half pound?

Take three from twelve, what is the remainder?

Take seven from twelve, what is the remainder?

Take nine from twelve, what is the remainder?

What is the difference between ten and twelve?

What is the difference between four and twelve?

What is the difference between seven and twelve?

What is the difference between two and twelve?

What is the difference between five and twelve?

What is the difference between eight and twelve?

What is the difference between six and twelve?

How many inches is a foot more than two inches? — than four inches? — than seven? — than five? — than ten? — than three?

How many feet are in a yard? How many dozen inches in a foot? How many dozen inches in a yard? — in two yards? — in three yards? — in four yards?

I shall be an hour and a half going to market with my eggs (said a woman to herself), and as long in coming home, and I shall surely sell my eggs in an hour and a half; how long, I wonder, shall I be away from home? Could you tell the woman what she wanted to know?

A man had four sons whom he sent to school; for the youngest he had to buy one school-book, for the next boy twice as many, for the next boy twice as many as that, and for the oldest twice as many as for

the next younger; how many books had each of the sons?

Another man had four sons; he had to buy twelve books for the oldest, three less for the next son, three less again for the next, and three less than that for the youngest; how many books had each of these boys?

A higgler bought a dozen rabbits to sell again; he sold three in one village, two in another, four in another, and one in another; how many rabbits had he then left?

How much are three halves and four halves in ones? How much are they when two halves have been taken away?

If I take a half from two ones, how much remains?

Instead of saying two (or two ones), how many quarters must we say? — also instead of three?

What must you add to three and five to have twelve?

What must you add to five and six to have twelve?

What must you add to four and three to have twelve?

What must you add to one and seven and three to have twelve?

What must you add to two and three and four to have twelve?

What must you add to three and two and two to have twelve?

A grocer bought a twelve-shilling hat of a hatter, who agreed to take a pound of seven-shilling tea in part-payment; how much money had the grocer then to pay to the hatter?

Molly, the house-maid, wore out a good broom in one year; next year she used up two; the third year one; but on the fourth year three, because they were not good ones; how many did she use in four years?

How many yards of carpet would be required for a passage ten feet long?

The figure or short mark for four is 4. Try if you can make it. Try again. Make the figure for the number which is half of this. Can you read the word "four"? Which takes the least time to write, "four," or 4? Which of the two do they call a word? Which do they call a figure? How many letters are there in this word "four"? If you had no figure but the figure 1, how should you write four in figures? — if you had no figure but 2? — if you had the figures 1 and 3 only?

A grocer owed a schoolmaster ten dollars for a quarter's education of his son; but the grocer had sent to the schoolmaster two dollars' worth of tea, three dollars' worth of sugar, one dollar's worth of plums, and two dollars' worth of coffee; which of the two now owed the other money, and how much?

A slip of geranium, the week it was planted, had

two leaves, the second week it had two more, the third week two more, the fourth week two more, and two more also on the fifth and the sixth week; how many leaves had it altogether on the second week? how many on the third week? — on the fourth? on the fifth? — on the sixth?

If the higgler we spoke of before, who sold ten rabbits, made a dollar profit by every four rabbits, how much profit did he make on those he sold? how much profit did he make on each rabbit?

If you were to take six half sacks from five whole sacks of flour, would any sacks of the flour be left?

There are four quarters in a yard; how many quarters are there in three yards? — how many in one yard and a half? There are five of these quarters in an ell; is an ell longer or shorter than a yard? how many quarters longer? How many quarters are in two ells? How much longer are three ells than three yards? How many yards would four ells measure?

A slip of geranium had one leaf the first week, two more the next week, two more the third week, and so on in the fourth, fifth, and sixth week; how many leaves had it at the end of each week?

The minute hand of a watch or clock goes quite round in an hour; the shorter, or hour hand, requires twelve times as much time to go round; how many hours does it require? — how many times faster does the minute hand go than the hour hand? (On

the occasion of the above exercise, a watch or clock should be shown to the pupil.)

How many are two-thirds and five-thirds? How many ones are seven-thirds? How much are one-third and four-thirds, if two-thirds be taken from them?

5 is the mark we make for others to look at when we want them to think of five; and other persons make it when they want us to think of five. Try and make it. Try again. How many marks or letters are there in the word five? — how many in the figure 5? Write in figures the two numbers that are equal to five.

Six and what are twelve?

Three and what are twelve?

Eight and what are twelve?

Five and what are twelve?

Two and what are twelve?

Seven and what are twelve?

Four and what are twelve?

Nine and what are twelve?

A toyshop man sold a dozen whistles for twelve cents; how much did he sell each whistle for? What did he sell half a dozen whistles for? What did he get for a quarter of a dozen? — for three-quarters of a dozen?

How many feet of deal board would a carpenter require to make a box, the top, bottom, and sides of

which were each a foot long, and the two ends were each half a foot long ?

How much cloth would be required to cover the cushions of six chairs, each of which took half a yard ?

How much would be required to cover six cushions, if a cushion required a third of a yard ?

A sick woman took one pill one day and two pills the next day, one pill the day after, and two pills the day after that, and so on; how long would a box of a dozen pills last her ? (The pupil may solve this question by the assistance of the counters, if it should be found, at first, too difficult for solution mentally.)

How many ones are there in one, two, and three added together ?

How many ones are there in first, second, and third added together ?

How many dozen apples are there in two half dozen ? — in six half dozen ?

How many ones are there in eight quarters ? — in six quarters ? — in ten quarters ? How many quarters are one quarter, two quarters, and three quarters ? What would they be called in ones ? How many quarters are a half and three quarters ?

Is there any other way, that you know of, for saying quarter ? (Fourth; half of half.)

Does any number of sixes amount exactly to twelve ?

Does any number of fives amount exactly to twelve?

Does any number of fours amount exactly to twelve?

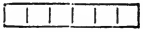
Does any number of threes amount exactly to twelve?

Does any number of twos amount exactly to twelve?

Does any number of fives amount nearly to twelve?

A man had a little room that was three yards long and two yards broad; and he went to a carpet-maker's to buy a carpet for it: he fixed on some carpet that was a yard broad; how many yards of carpet did he need to buy? (If the pupil does not readily solve this question, it may be separated into the two following: — How many yards of carpet should he have wanted if the room had been one yard wide? And how many would he need if the room were, as I said at first, two yards wide, or twice as wide? The child may also be required to draw on the slate a picture of the room divided into yards, and of the carpet that would cover it; thus: —

Room.



Carpet.

SECTION X.

THE figure or mark which stands for six is **6.** Make this figure on your slate. Make it again. Change 6 into figures of 2, that signify the same number of ones as six does. Change 6 for figures of 3 that are equal to it. What figure must you write down, as well as the figure 4, in order that you may have figures that mean the same thing as the figure 6? Write the figures 1 to 6, all in a row. Write the words, or names for numbers, from one to six, also.

While the carpenter's wife was gone to call her husband to dinner, the cat stole from the dish a fine beef-steak weighing ten ounces; she ate one ounce, and gnawed and spoiled two and a half ounces, before the woman came back; how much was left for the man and his wife?

A gig-horse was out twelve hours; he worked two hours at a time and rested one, and went on in this manner till the twelve hours were up; how many hours did he work and how many did he rest?

How many thirds of a sack could a miller divide two sacks of flour into ?

How many inches are half a foot ? — a quarter of a foot ? — a third of a foot ? — a sixth of a foot ? — one twelfth of a foot ?

A woman allowed a quarter of a pound of meat for dinner to each person of her family ; how many pounds of meat had she to send out for, as there were seven persons in her family ?

How many dozen apples are there in ten half dozen ? — in twelve half dozen ? — in five half dozen ?

A regular snuff-taker took half a dozen pinches every hour ; how many dozen did he take in the day of twelve hours ? How many pinches did a man take in an hour, and in a day, who only consumed half as much as the first man ?

How many yards of oil-cloth would a man require for the passages of his house ; one passage was seven yards long ; another was two yards and a half, another was one yard and a half long ?

Twice what is twelve ? — three times what ? — four times what ? — five times what ? — six times what ?

Toby Brown was sent on a message by his mother, and told to make haste back, but he loitered on the way, trying to get birds'-nests, and was an hour too late for the dinner at one o'clock : his mother then said that he should have nothing to eat till tea-time, at five o'clock ; how many hours had Toby to wait, after he got home, before he had anything to eat ?

A little boy was half an hour going to school in the morning; he was two hours there, and half an hour going home to dinner; in the afternoon he was half an hour going and returning, and an hour and a half at school; how many hours a day were spent by him in this manner?

There were, upon a common, five cows, four sheep, two donkeys, and a pony; two of these animals belonged to each cottage on the common; how many cottages were there on the common? Could each cottage have had one cow belonging to it?

What part of a foot are six inches? — four inches? — two inches? — three inches? — one inch?

How many cents are there in three two-cent pieces and a cent? — in four two-cent pieces and a cent? — in six two-cent pieces?

How could you say the same thing as quarter if you had no word for less than half? (Half a half.)

Tell me without looking, but by feeling only, how many things are in each of my hands, — in both of my hands, — and how many more things are in my right than in my left hand? (Five should be in the left hand, seven in the right.)

If I were to say "six" to-day, and were to go away, and you forgot to-morrow what number I had said, could you hear the word afterwards, though I was away?

If I were to write "six," and to go away, could you know by the figure afterwards?

Could you know afterwards from the word "three," if I were to write it and go away?

If I were to speak "six," could you tell what I meant by feeling with your fingers?

If I were to put out six counters, could you tell what I meant by means of your fingers?

If I were to write the figure 6, could you tell the meaning with your hand? — or if I wrote the word "six"?

(The object of these exercises is to cause the pupil to discover the use of written and vocal signs, &c.)

What number is twice five?

What number is twice six?

What number is twice four?

What number is three times three?

What number is four times three?

What number is three times four?

What number is twice three?

What number is six times two?

What number is five times two?

What number is four times three?

What number is three added to three, three added to them, and three added to them again?

When I want to write seven quickly, I make this

mark, **7**. Try and make it. Try again. If you had the figure of one only, how would you write seven? Could you write seven in twos, if you had the figure of two only? Could you write it with twos and ones? Write the figure 7; now write the same number in figures of one; which is the quickest way of writing seven? Which mode shows you soonest what you are to think of? Make any mark on the slate that is not a figure, as ⌐. When you see this mark. does it make you think of any number? But suppose that I had said make this mark ⌐ when you want anybody to think of seven, would the mark ⌐ have done for a figure of seven, instead of this, 7?

A carpenter, who was building a house, wanted hinges for the doors: each door was to have two hinges; so he sent his son to the hardware dealer' to buy them. He was to buy hinges for the back and front door, and for the parlor, kitchen, and bedroom doors; how many hinges did he buy? — how much did he pay for them, at a dime a pair? What change had he to bring back to his father, who gave him a dollar?

Four little school-boys thought they would learn to smoke, so they went into a tobacconist's shop, and bought some cigars. The first boy smoked half a cigar, and became very sick; the next boy was not sick until he had smoked a whole cigar; the third boy laughed at the others; but after he had smoked a cigar and a half, he, too, became very sick indeed: the fourth boy said that nothing would make him sick, so he went on smoking a long time; but he

had scarcely finished his second cigar before he became so ill that he could hardly stand, and he was obliged to get the first boy, who by this time had recovered a little, to lead him home, when he was forced to go to bed. How many cigars did it require to make these four boys ill? How many would have been needed if each boy had smoked as much as the third boy?

(It should be observed that this, and many other questions, are exercises for the attention, as well as for calculation; and the child should be told to be going on with the calculation while the question is being asked, that he may, if possible, answer it the first time that it is asked.)

In twelve, how many threes are there?

If you divide twelve by two, that is, into twos, what number of twos shall you have? Threes in nine, how many?

If twelve be divided by six, or put into sixes, how many sixes will there be?

If twelve be divided by four, or put into fours, how many fours will there be?

If twelve be divided by three, or put into threes, how many threes will there be?

Two is in twelve, how many? Four is in eight, how many? Four is in twelve, how many? Elevens in twelve, how many? Once exactly?

Tell me what smaller numbers you can divide

twelve by exactly; that is to say, what numbers are contained an exact number of times in twelve?

A groom, on a fine horse, overtook a man who was whipping an old horse, to try to make him go quick. The man complained that the old horse took an hour to go from Boston to Medford, which was only four miles. Oh! said the groom, my horse could go from Boston to Medford, and back, and half-way to Medford again, in that time. How many miles, then, could the groom's horse go in an hour?

What word is this, "seven"? Write the corresponding figure, that is, the figure which means the same number. How many letters are there in the word seven? How many more than in the figure 7? Write all the figures you know, beginning with seven, and ending with one. Write, instead of the figure 7, the figure 3, and that other figure, which, with three, is equal to seven. Write also the same thing with five and some other figure.

If there be seven houses in a street, what figure must be painted on the door of the first house? — on the last? — on the middle house?

Can you write down your own age with any figure or figures you know?

A dozen and a half of oranges cost twelve cents; how much did a dozen cost? — how much did half a dozen cost? — and a quarter of a dozen?

Tell me all the even numbers up to twelve.

Tell me all the odd numbers up to twelve.

Betty's mistress gave her a dollar, and told her to

buy half a pound of fifty-cent (five-dime) tea, and four pounds of ten-cent sugar; how much of the money should Betty bring back?

A gentleman once kept a mastiff, two terriers, a spaniel, and three pointers; but a terrier died, and a pointer was sold; how many dogs had he then?

Which of these two kinds of sugar is the cheapest, a pound for five cents, or a pound and a half for nine cents? and how much a pound is the one cheaper than the other?

What number is three taken from twelve, — three from the remainder, — three from the second remainder, — and so on as far as you can go?

What number is three added to one, three added to their sum, and so on as far as you can go?

The mark that is used to make persons think of eight is this, **8**. Try and make it. Try again. If you had only the figure 1, how many marks or figures must you make so that persons should think of eight? How many figures must you make to express eight if you had no figures but figures of two?

Can you read this word "eight"? — how many letters has it?

Write the figures of all the odd numbers under eight.

Write the figures of all the even numbers under eight.

How many sides have four triangles got? How many squares have the same number of sides?

What are ten and one called? What are ten and two called?

Ten and three are called thirteen, or three and ten; thirteen means three-ten, or three and ten.

Ten and four are called fourteen, or four and ten; it means four-ten. Put out fourteen counters; what is the number called that is one less than fourteen?

Ten and five are called fifteen, or five and ten; it means five-ten. Put out fifteen counters. What is the number called that is one less than fifteen? What number is two less?

Ten and six are called sixteen, or six and ten; it means six-ten. Put out sixteen pebbles. What number is that which is six less than sixteen?

What number is one less than sixteen?

What number is two less than sixteen?

What, now, should ten and seven be called? (Seventeen, or seven and ten.)

What, now, should ten and eight be called? (Eighteen, or eight and ten.)

What, now, should ten and nine be called? (Nineteen, or nine and ten.)

Put out nineteen counters or pebbles.

What should ten and ten be called? Ten and ten are not called ten-teen, but twenty; twenty means twice ten, or two tens. Put out twenty counters. How many less are eighteen? How many less are nineteen?

Try, now, if you can say the names of all the numbers from ten to twenty.

Two of a farmer's lambs ate as much as one hog, and three hogs ate as much as one cow; how many lambs ate as much as one cow?

On Monday a large spider watched all day, but could not catch anything to eat; on Tuesday he caught a wasp, on Wednesday he caught two gnats, on Thursday a bluebottle-fly, on Friday three flies and two bees, on Saturday he caught nothing; how much did he catch during the week? (The pupil should be told to answer such questions when they have been once asked.)

A cottager bought three little pigs for a dollar, and kept them till they grew large and fat; their food cost him two dollars. He then sold one for a dollar and a half, another for two dollars, and ate the third pig himself, which was worth a dollar and a half. How much did he get for his trouble in feeding and taking care of these pigs?

A miller's man could not write, and used to forget the number of sacks he had given out of the mill. His master said that he could not keep him if he made so many mistakes; so the man determined to put one bean into an empty drawer in the mill for every sack he gave out, and one pea for every half sack. By the time he had put nine beans and eight peas into the drawer, a young rat squeezed himself in, and ate two thirds of the beans and half the peas. How many beans and peas were wanting when the man came to look into his drawer?

The figure for nine is this, **9**. Try to make it on your slate.

Write down the figure for that number, three of which are equal to nine.

What word is this "nine"? What figure also stands for nine? How many letters do you save by writing the figure nine instead of the word?

Write the figures of two numbers that are equal to nine.

If I write the figure nine, can you tell by the smell what figure I have written? — by the taste? — by the touch? — by the ear? How could you tell what I had written?

Put out nine counters. Can you tell how many there are by smelling or tasting only? — or by hearing? — or by seeing? — or by feeling them?

(It has not been thought advisable, in this stage, to teach figures beyond nine. The figures for higher numbers could not be taught rationally unless Notation were explained, which is a difficult rule. With Notation and Numeration the second stage of Arithmetic should commence.)

A farmer made some cheese one week; the milk cost him a dollar, and the cheese, when made, sold for a half more, which paid him for his trouble in making it and sending it to market. Next week he made three times as much cheese; how much did the milk cost him? What did he sell the cheese

for? How much did he have for his time and trouble?

What is the name for ten and seven?

What is the name for ten and three?

What is the name for ten and nine?

What is the name for ten and ten?

An old swan, who was in a river, was attacked by three geese, and they fought, but the swan was as strong as all the geese. Four young swans then came up, and they would soon have finished the battle (for each young swan was half as strong as the old one), if a number of geese had not come up almost as soon: these geese were, altogether, as strong as the young swans. How many geese were there who came up last? What was the number of the geese altogether?

Write down in figures, "four and five are nine." Instead of writing down "and," or "added to," between the figures 4 and 5, there is a little mark, +, which means the same thing; thus, 4 + 5. The mark = means equal to; thus 4 + 5 = 9. I have here written the same thing as 4 added to 5 are equal to 9. Do you try to write down this in the short way. Write down in the same manner, two and two are equal to four. Next write down three and six are equal to nine. (2 + 2 = 4); 3 + 6 = 9.)

When I say the word "nine," is it your eyes that let you know what I say?

What is half the number of the sides of three squares?

Two men, named Smith and Johnson, bought a drove of lean cattle for six hundred dollars, and after feeding the cattle a whole year, and driving them a great way to market, they sold them for nine hundred dollars. The two men were partners, but Smith had twice as large a share as Johnson. How much of the six hundred dollars was Smith's? How much was Johnson's? And how much of the nine hundred dollars should each of these men have?

Tell me every other number from one to twenty, beginning with two, and going next to four, and so on. Do the same, beginning with one, and going to three, and so on.

If four girls could make a bed-quilt in three days, how long should one girl be about it? (If necessary, one day may be substituted for three days, at first.)

If there were twenty soldiers, and they were to be put into one row, how many would there be in that row? If they were put in two rows (or double ranks), how many would there be in each row or rank?

A farmer wanted a ditch to be dug round a large square field; he set two men to dig it; they finished the ditch on one side of the field in three days. The farmer then set four men to go on with the ditch; how long did the four take to dig the next side? — how long were they in digging the three sides? — how long would they have been if they had dug all four sides? — how long would the two men have been occupied in digging the whole ditch?

John, the footman, gave a splendid rap at my lord's door when the carriage, with my lady, got to the house, — he gave twelve strokes with the knocker: my lord himself returned soon from a walk, and gave half as many knocks as the footman: the dancing-master, who came afterwards, gave half as many knocks as my lord: the fat butler came next; he gave half as many as the dancing-master: and Bob, the butcher-boy, came last, and gave a third as many knocks as the dancing-master; — how many blows with the knocker did John, my lord, the dancing-master, the fat butler, and Bob, the butcher-boy, give?

An old man and his son were going home from a fair: the old man had a horse, but the young man had none; and, as the road was dirty, the young man went by two or three foot-paths. The foot-paths were nearer than the road. By going one foot-path the young man saved half a mile, by another he saved three-quarters of a mile, and by another he saved one mile. How much was his journey shorter than the old man's? How long was the young man's journey if it was three times as long as the distance he saved? How long was the old man's journey?

I will now write "nine less two are seven" in a short way; $9 - 2 = 7$. The little mark between the 9 and 2 means "less:" it means here that nine is to be made less by two, or made two less than it is. Write this down yourself. Write down in the same manner "eight less three is equal to five" ($8 - 3 = 5$). Four less three is equal to one ($4 - 3 = 1$). Write down in this manner "four and

three are seven" $(4 + 3 = 7)$; two and three and four are nine $(2 + 3 + 4 = 9)$; four and one and three are eight $(4 + 1 + 3 = 8)$.

Tell me all the ways by which you can let me know that you mean nine? (By saying the word, — by writing the figure, — by writing the word, — by nine counters or fingers, &c.)

There was a gang of brick-makers in a large brick-field; twelve men made the bricks; each three of these men had a boy to bring them clay; and each four of the twelve made bricks enough for one man to carry away and pile on the kiln: how many persons were there in this gang of brick-makers?

There were six small flights of stairs in a house which required stair-carpets; each flight required half a dozen yards; how many dozen yards of carpeting did the whole of the stairs need? — how much did this cost at three eagles the dozen yards?

A poor woman wished to go and see her daughter, who was ill, and who lived a long way from her; she found that the mail coach would charge her twelve dimes for the journey, and the wagon only a quarter of that sum: how much did the woman pay for her place by the wagon? The wagon travelled three miles an hour, the coach went three times as fast; how many miles an hour did the coach travel? If she took twelve hours to go by the wagon, how long would the coach have been on the road?

Can you count the numbers backwards, counting from twenty to one?

A gardener sowed carrots three years in a part of his garden: in the first year his carrot-bed produced very few carrots; in the next year he put on some manure, and the bed produced twice as many; in the third year twice as many as in the second. How many times as many carrots did the bed produce the third year as it did in the first? What part of the last year's carrots would be as much as those grown in the first year? Were the carrots produced in the first and second year as many as those grown in the third year?

Tell me every other number from twenty to one, beginning at twenty, going to eighteen, and so on. Do the same, but begin at nineteen, go to seventeen, and so on.

A miller had eight sacks of flour to take home to a farmer's; his horse could only carry two sacks at a time: how many journeys must the miller take to carry home all the flour? This miller had a cart which could take the eight sacks at once, but he knew that it would require as much time to get out the cart, and harness the horse, as to go one journey with two sacks; and he knew that, if he took the cart, he could not cross the common, but must go by the road, which would take as much time as two journeys of the horse alone. Would this miller save time by taking the cart?

Tell me every third number, beginning at one, going to four, and so on, to twenty. Do the same, but begin at two, go to five, and so on.

A man could buy a pound of the best cheese for

ten cents, and he could buy worse cheese for seven and a half cents a pound; how much of the worse cheese could he buy for ten cents?

What part of twelve is eight?

What part of twelve is three?

What part of eight is two?

What part of twelve is nine?

If you could hem a dozen handkerchiefs in eight days, but the handkerchiefs were wanted in two days, how many girls, who sewed as quickly as you, must you have to help you?

Which is most, two-thirds or three quarters?

If you were to take two-thirds from one, how much would be left?

Some rich men wanted to have a canal dug between two towns; they found that the canal they desired would take a thousand men a whole year to dig it, but they wanted the canal to be dug in half a year: how many men would then be needed? — how many diggers would be wanted if the canal must be finished in a third of a year? — in a quarter of a year?

Let the pupil be required to write down the following questions in the abbreviated or algebraical mode, and find answers: —

Three and two are what? $(3 + 2 = 5.)$

Two and four and two are equal to what?

Five and one and three are the same as what?

Seven with two taken from it is what? (7 — 2 = 5.)

Nine less three is equal to what?

Eight less by three is the same as what?

(In these exercises no higher number than nine should be expressed in figures.)

THE END.

EXERCISES
FOR THE IMPROVEMENT OF THE SENSES
FOR YOUNG CHILDREN.

By HORACE GRANT,
Author of "Arithmetic for Young Children."

Edited by Willard Small.
Cloth. Price, 50 cents.

For the purpose of producing instruction and amusement for young children, too young to read or write, this little work has been prepared. The special object is to excite little children to examine surrounding objects correctly, so that valuable knowledge may be acquired, while the attention, memory, judgment, and invention are duly exercised.

In exercises such as those which compose this book, the most favorable circumstances may be seized as they arise, and will therefore produce an extraordinary effect. Wherever we are, in a room, garden, field, or road, in the morning or evening, winter or summer, action or rest, something interesting may be extracted; for at the moment when the attention is warmly excited, an event may be turned to the best account. The valuable habits acquired by means of familiar objects and petty events may gradually be extended to the most important subjects.

ARITHMETIC FOR YOUNG CHILDREN

Being a series of Exercises exemplifying the manner in which Arithmetic should be taught to young children

By HORACE GRANT.

American Edition, Edited by WILLARD SMALL.

Price 50 cents.

"Consists of a series of exercises illustrative of the manner in which the first steps in numbers should be taught to young children. We pronounce it *first-rate*. The primary teacher will find it a great aid in her work. It is rational and consistent. The variety of style and method used lend fresh interest at every step."—*Educational Weekly.*

"The forms of expression used and the copiousness of illustrations are very far in advance of the common style of teaching this science to young children.

"It is thoroughly rational and prepares the way for a more systematic study of numbers as the child becomes more mature. The young pupil is taught to think and speak in numbers in the first stage and subsequently unites with it the art of writing numbers. It is correct in theory and apt for practice."—*N. E. Journal of Education.*

SOULE & CAMPBELL'S
PRONOUNCING HANDBOOK
OF
WORDS OFTEN MISPRONOUNCED,
AND OF WORDS AS TO WHICH A CHOICE OF PRONUNCIATION IS ALLOWED.

3000 Mistakes in Pronunciation Corrected.

A POCKET VOLUME.

PRICE 50 CENTS.

In the able article on "CHARACTERISTICS OF PRESIDENT GARFIELD," in *The Century Magazine*, its author, E. V. SMALLEY, thus alludes to this little book:

"He had a great love for linguistic knowledge, and would often make a half-game and half-study with his children of telling the meanings of words, or detecting errors in pronunciation. Dropping in at his house, one morning in the campaign summer of 1880, just as breakfast was over, I found the family lingering at the table while the General read from a little dictionary of words frequently mispronounced. He would spell the word, and then ask each in turn what the correct pronunciation should be. The elders were about as apt to make mistakes as the children, and a great deal of lively chat and merriment, and not a little instruction, resulted from the exercise. This he kept up every morning after breakfast until the book was exhausted."

Punctuation and Other Typographical Matters.

For the use of Printers, Authors, Teachers, and Scholars. By MARSHALL T. BIGELOW, Corrector at the University Press, Cambridge. Small 4to. CLOTH, 50 CENTS.

Lenox Library, New York, Aug. 19, 1881.

DEAR MR. BIGELOW, — I sent for your "Punctuation and other Typographical Matters" (having long groaned over bad pointing in authors and printers), and was glad to find an excellent manual which will contribute to the comfort of many. I cordially recommend it to all authors, printers, and men of letters.

Faithfully yours,

Allibone's Dictionary of Authors. I. AUSTIN ALLIBONE.

"Mr. Bigelow's book is a practical treatment of the subject, and enlarges the reading public's obligations to him." — *Atlantic Monthly.*

"It is intended for the use of authors and teachers, while business men who have occasion to print circulars, advertisements, etc., can hardly afford to be without a copy of it for reference." — *Schenectady Daily Union.*

Mistakes in Writing English, and How to Avoid Them.

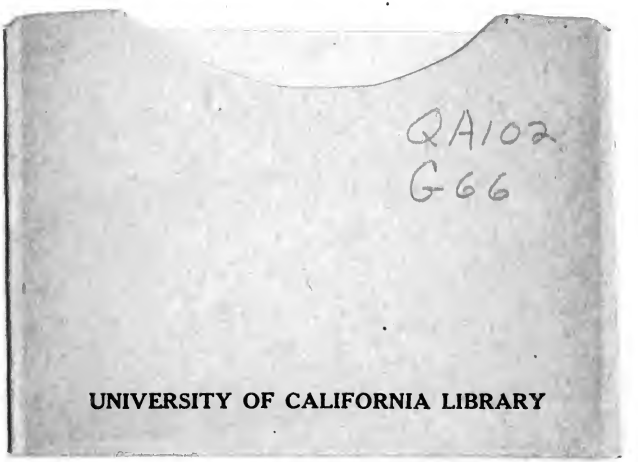
For the Use of all who Teach, Write, or Speak the Language. By MARSHALL T. BIGELOW, author of "Punctuation and other Typographical Matters." CLOTH, 50 CENTS.

"This is an admirable little work; the more admirable for the use of busy people, because it is little, since it is also clear and comprehensive. The errors pointed out are those to which nearly all writers are liable. . . . We commend it as the most convenient little manual of which we have knowledge." — *Christian Herald.*

"This is a valuable little volume. It is not a grammar, with rules and definitions; but it takes up words and parts of speech, and shows, generally by example, their correct use. It is arranged systematically, and is adapted to the use of the home and the school." — *The Current.*

"The matter is well arranged, and the points upon which instruction is desired can be readily found." — *Christian Union.*

"This is a useful book. A careful study of the several chapters would be of great advantage to all who have to do much or little speaking or writing." — *Gospel Banner.*



ARITHMETIC

FOR

YOUNG CHILDREN